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JUNIOR GEOGRAPHY

BY

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PREFACE

THE present volume contains the Regional Geography necessary for the Oxford Junior Local Examinations, and for other examinations of the same standard. The Preliminary volume, in course of preparation, will deal more particularly with physical geography. The numerous maps inserted in the text should be used along with it, and supplemented by a good atlas and wall maps. For travellers' descriptions of scenery in different parts of the world teachers should refer to the series of Descriptive Geographies edited by the writer (published by A. and C. Black).

During the unavoidable absence of the writer from England the proofs have been read by his wife, who is responsible for any errors which may have escaped detection.

OXFORD,
August, 1905.

OF the illustrations not specially drawn for this volume, numbers 11, 18, 19, 23, 25, 26, 28-30, 32-36, 38-48, and 50 have already appeared in Mr. H. J. Mackinder's *Britain and the British Seas*; numbers 69-76 in Professor Partsch's *Central Europe*; numbers 87, 88, 96, 104-107, and 132 in Mr. D. G. Hogarth's *Near East*; numbers 94, 95, 97, 98, 110, and 112-118 in Sir Thomas Holdich's *India*; numbers 119-123 in Mr. A. Little's *Far East*; and numbers 146, 151, 153, and 155 in Professor Russell's *North America*, published by the Clarendon Press.

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JUNIOR GEOGRAPHY

THE BRITISH ISLES

PHYSICAL FEATURES OF BRITAIN.

THE maps in figs. 1 and 2 show the British Isles and the neighbouring parts of Europe. The largest island is Great Britain, which lies to the east of Ireland, the next largest. To the west is the Atlantic Ocean. The St. George's Channel and the North Channel lead to the Irish Sea, between Ireland and Great Britain, and the English Channel and the Strait of Dover lead to the North Sea, which open to the Atlantic in the north.

Measure on the map in fig. 2 the distance from Cape Wrath to the Lizard. It is $2\frac{1}{8}$ inches. The actual length has been measured, and is about 600 miles.

Every inch on the map, therefore, represents $282\frac{1}{2}$ miles of land, or, as there are 63,360 ($12 \times 3 \times 1760$) inches in a mile, every inch on the map represents $282\frac{1}{2} \times 63,360$ or very nearly

17,900,000 inches. That is to say the map is 1 : 17,900,000 of the real size of our islands.



FIG. 1. The British Isles and neighbouring Lands. Iceland in the NW. Scandinavia in NE. Jutland peninsula and western part of Continental Europe on E. and S. In the W. is the Atlantic Ocean, E. of Great Britain the North Sea, between Iceland and Scandinavia the Norwegian Sea.

Measure the length of Ireland, the width of Great Britain at the narrowest and widest parts, the breadth of the North Channel, Irish Sea, the English Channel at its widest, the Strait of Dover, and the North Sea on the map. Calculate how many actual miles this represents in each case. Compare



FIG. 2. The British Isles and surrounding Land and Sea. Cape Wrath is the north-westerly point of Great Britain, the Lizard the most southerly point in the south-west. Cape Wrath, 5° W., is almost due north of the Lizard, $5\frac{1}{4}^{\circ}$ W.

the results with measurements on fig. 4, using the scale of miles shown on fig. 4.

Next, place the tracing-paper over the map. Count the number of little squares covering Ireland. The side of each of these little squares is one-tenth of an inch, and there are one hundred of the small squares, ten rows of ten each, in the

square inch enclosed within the darker lines. Each of the small squares, therefore, represents $\frac{1}{100}$ of a square inch. Now, as on this map a linear inch represents $282\frac{1}{2}$ miles, a square inch will represent $282\frac{1}{2} \times 282\frac{1}{2}$ square miles, that is 79,806 square miles, and each little square will represent $\frac{1}{100}$



FIG. 3. Highlands and Lowlands, Shallow and Deep Seas of and round Britain.

of this, or 798 square miles. If there are 41 little squares covering Ireland, its area must be 798×41 , or about 32,700 square miles. Measure similarly Great Britain, the area of which will be found to be about 88,000 square miles.

The next map (fig. 3) shows five lines. The middle one is the shore-line, which is the boundary between the black and

white in the map in figs. 1 and 2. The two outside it show where the shore-line would be if the level of the sea were to sink 600 or 3,000 feet. The inner two show where the shore-line would be if the level of the sea were to rise 600 or 3,000 feet.

From this map it appears that the British Isles rise above shallow seas, and that if the sea were to sink 600 feet they would become part of the mainland of Europe. The part of the Earth's crust covered by shallow seas is called the continental shelf. Islands rising from the continental shelf are called continental islands. The British Isles are continental islands.

The lands between sea-level and 600 feet above it are called lowlands. The lowlands of Britain, as we shall call the British Isles, are extensive, and if the sea were to cover them, only the higher land, represented by the dark area, would be left rising above it. This higher land, over 600 feet above sea-level, we may call highlands. Measure the areas of the lowlands and of the highlands in Great Britain and Ireland, and compare them.

The highlands of Great Britain are arranged in three main groups and a number of smaller ones. In the north are the Scottish Highlands, in the centre the Central Uplands, to the west of their southern end the Welsh Highlands. To the east and west are the Eastern and Western English Plains, which run far to the south and are connected through the Midlands. East of the Eastern Plain and south of the Midlands are the Eastern Scarp Lands. South of the Bristol Channel are the South-west Uplands. Speaking generally, the highlands of Great Britain lie in the north and west, the lowlands in the east and south.

In Ireland the highlands are round the margin. The lowlands form the Central Plain. This plain reaches the east and west coasts, but extends only in narrow belts to north and south between the isolated masses of the northern and southern Irish Highlands.



FIG. 4. Highlands and Lowlands of the British Isles.

Rivers. A river must not be thought of merely as a stream of water. In times of flood it carries off large quantities of soil, and even stones, from the surface of the land. We must think of all the surface-soil in the basin of a river as slowly moving downwards after each rain-storm towards the visible river, which sooner or later will carry it away. During flood the muddy appearance of the water of a river shows how loaded it is with particles of soil, but after flood it becomes clear again. Where does the sediment go? It falls to the bottom, and forms the sand and mud of its bed. When the river overflows its banks sediment settles on the flooded surface and forms a thin layer over it. Part of this sediment, which is nothing but crumbled rock, is carried out to sea. At the mouths of many of our rivers there are great sand and mud banks. The tides and currents carry part of this sand and mud away, and distribute it along the coast. In lakes, or tideless seas, it is not so carried away, but accumulates until the bottom of the lake or sea near the river-mouth is raised above the level of the waters. Across these recently-formed mud flats the waters of the river pass, but as there are no marked banks the stream divides into a number of channels, or distributaries. At the mouth of each of these the same causes are continually raising the bottom by new deposits of sediment, or silt. Thus the land at the mouths of such a river becomes fan-shaped, and is called a delta, from the Greek letter Δ , which it resembles in shape. If the stream enters at the side of a narrow lake it may build a delta right across the lake, and divide it into two.

Turn to fig. 4, and look carefully at the highlands and uplands of Great Britain. Notice that the main valleys run at right angles to the belt of highest land, except at the ends. Many of the rivers flowing in these valleys are turned round when they reach the lowlands, so that they flow parallel to the base of the highlands until they reach the sea. In the scarp lands (see p. 80) the rivers flow parallel to the scarped ridges, or else at right angles to them. In Great Britain,

where the highest land is nearest to the west coast, the long rivers flow to the east, the short ones to the west, but the rivers in the east of Wales are carried round across the lowlands, to the north-west or south-west.

In fig. 5 the chief rivers, river basins and divides are



FIG. 5. The chief Rivers, River Basins, and Divides. The main divides between rivers flowing N., S., E., or W. are shown by dashes, the minor divides by dots.

shown. Compare figs. 4 and 5, and, choosing the basins of the chief rivers, notice how far they are in the highlands, how far in the lowlands, and how the navigable parts of the rivers are in the lowlands, especially of England and Ireland. This is because the current of a river is swiftest where the slope

is greatest. A river has less water and is less deep in the upper part of its course than in the lower part, when it has received most of its tributaries.

Vegetation. Every one is familiar with grass and wood-



FIG. 6. The Vegetation of the British Isles. Compare this with fig. 4.

land, but those who live in highlands know that trees will not grow above a certain height. On the higher ground heathy moors, and, in the flatter parts, peat bogs are common ; below are the woods, and in the flat plains and in many of the mountain valleys are grassy parts which may be culti-

vated. Some parts of the lowlands, such as the Fens, are quite waste, because they are marshy. Round the shores there are many arid sand-hills, or dunes.

Plant and Animal Products of Britain. In fig. 6 we have shown the parts of Britain covered respectively with forest, grass, cultivated land, moorland, poor pasture, and waste land. Compare this with the map in fig. 4. Most of the poor pasture and waste land is in the mountain area, but in Ireland such patches occur in the lowlands, where there are peat bogs.

On these poor lands sheep are pastured. It is easy to get materials for a map showing the distribution of sheep in Great Britain and Ireland. Every year a farmer fills up a form stating how many sheep and cattle he has, how much land he has sown with wheat, barley, oats, &c., and how much of his farm is in grass. These forms are sent to the Board of Agriculture in London, or Dublin, and from them are compiled reports which give the number of sheep, cattle, &c.; the acreage of pasture and arable land, and the crops grown on the arable land. The country is divided into administrative counties. In a large county there are usually more sheep, cattle, &c., than in a small one. In Lancashire, for example, there are about 335,000 sheep, and in Oxfordshire only about 232,000. In spite of this sheep-rearing is more important in Oxfordshire than in Lancashire. To compare the importance of sheep, cattle, &c., in different counties we must know not merely the total number in each county, but also the total number on a given area. Take 1,000 acres, a little over $1\frac{1}{2}$ square miles, as the given area, and compare the number of sheep it supports in the two counties. Oxfordshire, with over 480,000 acres, supports 483 sheep per 1,000 acres; Lancashire, with nearly 1,200,000 acres, supports only 280 sheep per 1,000 acres. Sheep-rearing is therefore nearly twice as important in Oxfordshire as in Lancashire. The map in fig. 7 shows the number of sheep per 1,000 acres in each county. It will be seen that sheep are most numerous in Kent, in the belt of scarped

ridges from Dorset to Yorkshire, in the Southern Uplands of Scotland, especially in the east, and in Wales, especially in the centre.

Compare this with fig. 8, which shows the number of cattle per 1,000 acres. Cattle are most numerous in the west of Great Britain, and in Ireland. There are comparatively few where sheep are numerous.

Having learned the facts, we must next see if they can be explained. Why should cattle be more numerous than sheep



FIG. 7. Distribution of Sheep in the British Isles. Compare with figs. 4 and 13.



FIG. 8. Distribution of Cattle in the British Isles. Compare with figs. 4 and 13.

in Ireland? and why should sheep be more numerous than cattle in the east of Great Britain? A comparison with the relief-map shows us at least one thing. Cattle are more important on the lowlands, as for example in Cheshire, or Pembroke, and sheep in the hill districts, as, for example, in Central Wales. This is not the whole explanation, but before we look for other causes we must consider the distribution of agricultural and pastoral districts.

Fig. 9 shows the number of acres of land in crops per 1,000

acres in each county, and fig. 10 to the number of acres in pasture per 1,000 acres in each county. The greater part of the non-agricultural land lies in the mountains. The lowlands of the west and north are less cultivated than the lowlands in the east and south.

On the arable lands are grown cereals, mainly wheat, barley, and oats; root crops, such as potatoes and turnips, beans, peas, and grass for hay or fodder. These are not grown indiscriminately all over the arable land. Fig. 11

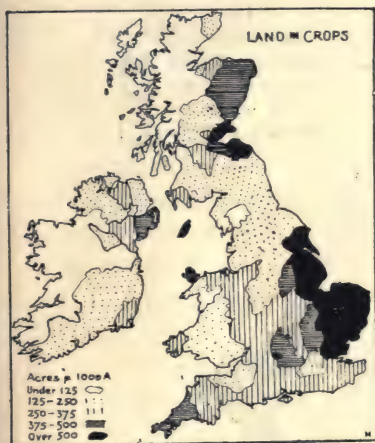


FIG. 9. Distribution of Arable Land in the British Isles. Compare with figs. 4, 13, and 10.



FIG. 10. Distribution of richer Pasture in the British Isles. Compare with figs. 4, 13, and 9.

shows the number of acres producing wheat per 1,000 acres of arable land for each county. This cereal is mainly confined to England, and especially to Eastern England, where it is most important in East Anglia, and the land drained by rivers flowing to the Wash. Elsewhere oats are the chief cereal. Barley is grown everywhere, but most is raised in the wheat-producing counties.

Some parts of the country produce distinctive crops. Hops, which are used in making beer, are largely grown south of the Thames in the east, and in the middle of the Severn basin.

Flax, whose fibres are used for linen, is grown in the north of Ireland, especially in the north-east. Ireland is the country where most potatoes are grown. In Great Britain turnips and mangolds are the chief root crops. Market-gardens are found near the great towns.

These facts show that the eastern lowlands are arable; that the hills and the western lowlands are pastoral; that sheep are commoner on the eastern hills, and cattle on the

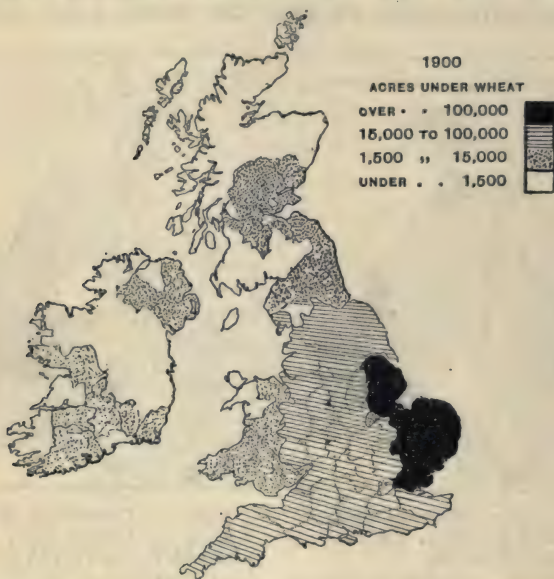


FIG. 11. The Proportion of Land under Wheat in different parts of Britain.

western lowlands; that wheat is grown in the east of England between the Thames and the Wash, potatoes in Ireland, hops in the east of Southern England, and in the plains to the east of the Welsh mountains. Evidently the distribution of hills and plains does not alone account for all these differences. Nor are they entirely a question of soil. Many sheep are found on the limestone ridges, but there are also many on the older rocks, so that soils do not account completely for their distribution. We must look to the air above as well as to

the ground beneath, before we can account fully for all the peculiarities of all the maps.

Climate of Britain. A map which shows different conditions of the atmosphere is more difficult both to make and to understand than one which merely shows where sheep or cattle, grass or wheat, are to be found. Most of the atmosphere consists of air, which is invisible. It contains a small proportion of water, which rises from the surface as invisible vapour, gathers into visible cloud or mist, and falls as liquid rain, or solid hail or snow. We can measure this rain or snow by catching it in a vessel. If we put out water in a plate on a warm dry day the water disappears, or evaporates, that is, it passes into the air as invisible vapour. Unless we bring in the vessel into which the rain has fallen as soon as the shower is over, the water in it begins to evaporate, and our measurement will not be correct. To prevent this a special rain-measurer, or rain-gauge, is used. In fig. 12 such a rain-gauge is shown. The funnel allows all the rain entering it to run into the lower part, from which it also prevents evaporation, so that the depth of the rain in this lower part is the measure of the rain that has fallen. This is given in inches. It is measured at fixed intervals, and the amount is recorded. If snow falls, it is melted, and the depth of water produced is measured. The recorded amounts are added up at the end of a month, and the monthly totals are added together at the end of the year. In this way the amount of rain and snow which has fallen during the year can be accurately measured.

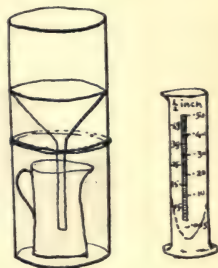


FIG. 12. Rain Gauge.

Some years are wet. Others are dry. To discover what is the average, or mean, rainfall which may be expected in the year the totals for a number of years are added together, and the sum is divided by the number of years. At Dr. Mill's observatory in Camden Square, London, the rainfall during

five years was as follows:—1900, 23.3 inches; 1901, 22.2 inches; 1902, 20.8 inches; 1903, 38.1 inches; 1904, 20.7 inches. Total for 5 years, 125.1 inches. Average for 1 year, 25 inches. When the average annual rainfall for a number of places has been found in this way, the figures are entered on a map.



FIG. 13. Mean Annual Rainfall of the British Isles.

Lines are then drawn which pass through places with the same rainfall. In this way the country is divided into districts with different amounts of rainfall.

In fig. 13, the lightest area indicates the land where less than 30 inches of rain falls on an average every year. The line which separates it from the next slightly darker area passes

through places with an average rainfall of exactly 30 inches in a year. The places in the second lightest area have a rainfall of between 30 and 40 inches, nearer 30 inches where they are nearer the 30-inch line, and nearer 40 inches where they are nearer the 40-inch line. The third lightest area has a rainfall of between 40 and 60 inches annually. The wettest districts of all, which receive over 60 inches a year, are indicated by the solid black patches. The wettest districts are in the west of the Scottish Highlands, in the Lake District, and in two very small parts of South Wales and South-west Ireland. The west is wet, both in the north and in the south.

When we compare this map with those showing the distribution of sheep and cattle, of arable land, and wheat land, we see that they resemble each other in many ways. The eastern arable land is relatively dry, the western pasture land is wet. Sheep are found in the drier parts, cattle in the moister parts, outside the mountain area, and wheat is cultivated only in the very driest parts of the east.

The wheat map, however, shows that wheat is cultivated in the southern counties only, and not all over the east. Little is raised in the equally dry parts further north. This shows that something beside low land and a low rainfall is necessary to make a good wheat-growing land. What this is we shall find by looking at the temperature map in fig. 16.

We feel warmer in summer than in winter, because the air around is warmer, or, as it is expressed, has a higher temperature than in winter. The temperature of the air, that is to say, the hotness or coldness of the air, is measured by a thermometer. (See *Preliminary Geography*.) A thermometer put in a screen, so as not to be exposed to the Sun's direct rays, shows the shade temperature, or temperature of the air. Other thermometers are used which register the highest, or maximum, and the lowest, or minimum, temperature for every day. By adding the two together, and halving the result, we get what is called the mean temperature

for the day. If the maximum temperature on a given day is 55° , and the minimum 37° , the mean is $55^{\circ} + 37^{\circ} \div 2 = 46^{\circ}$. By adding together the mean temperatures of every day for a month, and dividing by the number of days in the month,



FIG. 14. Mean Annual Temperature of the British Isles. Notice how the isotherms follow the contour lines. Compare fig. 4.

we get the mean monthly temperature. By adding together the mean temperature for each month of the year and dividing by 12, we get the mean annual temperature. Fig. 14 shows the mean annual temperature of the layers of atmosphere

immediately in contact with land and sea. To make such a map the mean annual temperature of the atmosphere at various places is entered on a map, and lines are drawn through places which have the same. These lines of equal temperature are called isotherms. In order to make the map clearer, the spaces between the isotherms are shaded. The darker shading shows where the air near the surface is colder, the lighter shading shows where it is warmer. The surface air over the highlands is colder than that over the lowlands. The hillier parts of the country, therefore, stand out with dark shading. If we climb a high hill we soon discover that the air grows colder as we ascend. In winter the tops of the hills remain white with snow long after the snow has disappeared from the valleys and plains below. Trees, we have already seen, will not grow on mountains above a certain height, another proof of the greater cold at that height. Observations have been made which show that it becomes 1°F. colder for every 300 feet of height. On the top of Ben Nevis it is usually about 15° colder than at Fort William, 4,400 feet below.

Let us now compare the air temperatures of places which are about the same height above sea-level. The temperature of the lowlands is far colder in the extreme north than in the extreme south. Why, then, should the air be colder in the north than in the south? The answer is that the Sun does not rise so high in the heavens in the north as it does in the south. At the Lizard the Sun is 40° above the horizon at noon, but in the Shetland Islands only 30° . The higher the Sun rises the greater is its power of warming the Earth's surface, as we know by comparing the temperature shortly after sunrise, when the Sun is low, with that of noon, when it is high above the horizon. The fact that the Sun rises higher above the horizon in the south explains why the air temperature is higher in the south than in the north.

The maps for October and April, when the days and nights

are nearly equal, are very similar to that for the year. The maps for July, however, when the days are long, and for January, when they are short, are very different.

In most temperature maps the temperatures do not show the exact temperature of a place, but what it would be at sea-level at that place. This is obtained by adding 1°F. for every 300 ft. the place is above the level of the sea. The isotherms now drawn do not show the influence of the height of the land, and so present a much clearer picture. Compare the map of April (fig. 15) with that for the year, and notice how simple the former is.



FIG. 15. Mean Temperature of the British Isles in April. In this map the temperatures are those which would occur were the land at the sea-level. Compare it with fig. 14, where the mean annual temperature is shown as it is actually observed at the existing surface of the land.

Fig. 16 is a map showing the mean temperature of the atmosphere for July. Looking at the sea and the lowlands we notice that the mean temperature in the south is between 61° and 62°F. , which is much warmer than in the north, where it is under 56°F. This is what we should expect from the fact that the Sun rises higher in the south than in the north.

There is another point, however, to consider. The days are longer in the north than in the south. The map shows that the greater length of the day in the north is not enough to counterbalance the effect of the Sun rising higher in the heavens in the south, and shining more directly down on the earth.

Look at the map more carefully and compare the temperature of the air over the sea and the temperature of the air

over the lowlands along a line where the days are of the same length, and where the Sun rises to the same height at noon. The air over the centres of Ireland and England is warmer than that over the coasts and seas around. The air over the east coast is a little warmer than that over the west coast. The warmest air of all is not in the extreme south over the English Channel, but over the lower Thames valley, where the air temperature is over 64° in places.

Turn now to fig. 17, which shows the mean temperature of the lower atmosphere for January. Notice, first, that the



FIG. 16. Mean Temperature of the British Isles in July, reduced to sea-level.

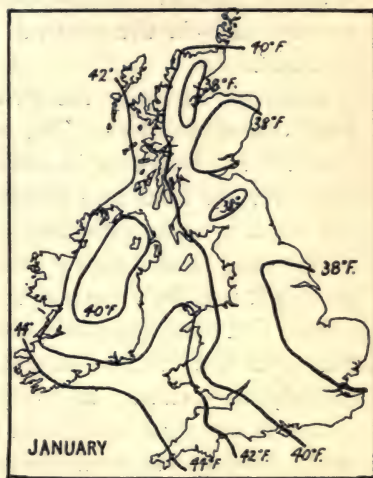


FIG. 17. Mean Temperature of the British Isles in January, reduced to sea-level.

isotherms on the whole run north-south, instead of west-east, as they do in April, and that over the south coast of England, from the Isle of Wight to the Strait of Dover, the air temperature is from 39° to 40° F., which is the air temperature found over the north coast of Scotland. This is very remarkable. The Sun is as much higher in the heavens at noon in the south as in the other months, while the days are also very much longer than in the north.

Before trying to explain this, look again at the map. Notice

that along a line where the days are equal and the Sun rises to the same height at noon, there are nevertheless differences between land and sea. The air over the sea is warmer than that over the lowlands in the centre of the land. This is especially well-marked if the temperature over Central Ireland is compared with that over the Atlantic and the Irish Sea. The air over the east coast in January is much colder than that over the west coast.

The coldest parts of the lowlands are found in different parts of the east of Great Britain, where the air temperature is under 38°F . in the south as well as in the north. Over the western seas, in the north as well as in the south, the air is over 42° .

Compare carefully the two maps of figs. 16 and 17, and mark the differences. The most striking are (1) that the air over the sea is cooler in summer and warmer in winter than that over the land, and (2) that in summer the atmosphere in the north is colder than that in the south, but that in winter the atmosphere in the east is much colder than that in the west, though it is a little warmer than that in the west in summer.

The fact that the atmosphere over the sea is colder than that over the land in summer and warmer in winter is extremely important. It depends on the fact that the atmosphere is mainly heated from the surface of the land or water, and, to a very much smaller degree, by the Sun's rays which pass through it. The land absorbs heat more rapidly than the water, but the heat does not penetrate far beneath the surface. Water is not only heated more slowly, but the heat is carried downwards by the moving particles of water, so that a greater mass of water is heated. But the Earth is radiating heat into space as well as absorbing heat from the Sun. This radiation is more rapid from the surface of the land than from that of the sea. The land has a thin surface layer, which is rapidly heated during the day and equally rapidly cooled during the night, when the days and nights are equal in length. The water has a thicker layer, which is more

slowly heated during the day, and more slowly cooled during the night. In summer, when days are long and nights are short, the layers both of land and sea absorb more heat than they radiate, and become warmer and warmer. This happens more gradually in the case of the sea than of the land, but as the heat-storing layer of the sea is thicker than that of the land, and parts with its heat less readily, it is later in reaching its highest temperature ¹.

The lower layers of the atmosphere in contact with the land are more rapidly heated from the warmer surface layers of the land than the atmospheric layers touching the colder surface layers of the sea. This explains why in the July map the air temperature over the land is higher than that over the sea. In winter the atmosphere becomes colder where it is in contact with the colder layers of the land than where it touches the less cold layers of the sea. This explains why in the January map the air temperature over the land is lower than that over the sea.

We have next to explain why the air over the west should be so much warmer than that over the east in winter, and slightly cooler in summer. In the first place we must remember that the British Isles have an ocean on the west, and a continent on the east. It is, therefore, to be expected that the west coast atmosphere should be slightly cooler in summer and slightly warmer in winter than that of the east coast. What, then, about the North Sea in the east? The North Sea is a very shallow sea, not so deep as the layer of water affected by seasonal changes of temperature, and it is surrounded by land except in the north. It is colder in winter and warmer in summer than the waters at corresponding depths in the vast Atlantic Ocean in the west. It has

¹ The surface layers of the land are warmest in July, not long after the Sun has reached its highest summer position in the heavens, but it is not till August that the surface waters of the sea reach their highest temperature. The reverse happens in winter, and the surface layers of the land are coldest in January, the month which follows the shortest day, while those of the sea are not at their coldest until a month later, in February.

some influence, especially in summer, as is shown by the bending southwards of the isotherms near the east coast in the July maps. In winter it has little.

We must remember that the atmosphere is not at rest, but always moving. The direction from which the wind comes is indicated by the arrow of the wind-vane, or the head of the weathercock. If this direction is noticed every day it is found that on two days out of three the wind comes from the west,



FIG. 18. Winds of the Atlantic: (a) in Winter, (b) in Summer.

or the south-west, that is to say, from the Atlantic. The arrows in the left-hand map in fig. 18 show the direction of the prevailing winds in January. They bring atmospheric layers which have been in contact with the Atlantic waters. These, as we have seen, are warmer in winter than the layers of land in corresponding latitudes. Moreover, the south-west winds come from warmer latitudes as well as over the relatively warmer sea. These currents of warmer air make the west coast relatively warm, but when they pass over the cold land they become more

and more chilled as they advance eastwards, and thus are colder on the east than on the west coast. The winds that come from the east during this season, on the other hand, come from colder lands and over colder seas. The east of Britain is colder than the west in winter because the winds do not bring warm air, as in the west. In spring and autumn the south-west winds are not nearly so strong, and in spring they are not so frequent, while the easterly winds are not so cold. The air temperature over the west coast is, therefore, nearly the same at these seasons as that over the east coast.

In summer the south-west winds are still weaker, and, although the sea is cooler than the land in the same latitudes, these winds come from warmer latitudes, and have much less influence in cooling the land than they have in heating it in winter. (See right-hand map in fig. 18.)

We are now better able to explain the distribution of pastoral and agricultural land, and even of sheep and cattle, and of wheat and other crops. The wetter, milder west is grass-land suited for cattle, which require the best and softest grasses. It is only in the drier districts of the east, which are the warmest parts in summer, that much wheat is grown, for this grain will not ripen without heat and dry air. Sheep, which do very well on dry, wiry grass, and well-drained land, are commonest on the drier eastern slopes of the highlands, or on the eastern hills. The English scarp-lands, which consist of limestone, into which the water readily sinks, are specially suited for sheep.

This study of climate shows that it is not due to accident that certain products, whether plant or animal, are found where they are. Farmers have learned by long experience what parts of the British Isles suit the various kinds of live stock and field crops. We shall see later that this rule about the relation between products and rainfall applies to other countries as well, and that wheat and other cereals are grown only where certain kinds of climate are found. For this reason it is important to understand thoroughly the relation

between climate and the distribution of plant and animal products in the British Isles.

Distribution of Population. Every ten years the people of Britain are counted, and this was last done in 1901. Not merely are the numbers of men, women, and children taken, but the occupations in which they are engaged are also noted. In the reports of this numbering, or Census, as it is called, we

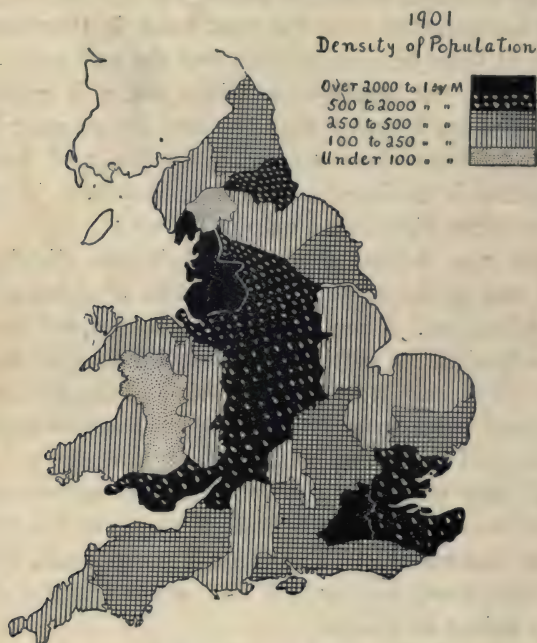


FIG. 19. Distribution of Population in England and Wales in 1901.

can find out the number of people engaged in agriculture, fishing, manufacturing, teaching, or in any other way, for the whole country, and for the different counties. A map can be made to show how the people employed in any single occupation, or in any group of occupations, are distributed. Here again, however, if we wish to compare one part of the country with another, it is not enough merely to write down

the total number for each county. We must first calculate the number per 1,000 acres, as we did with the cattle and sheep¹.

When this has been done, and the figures entered on a map, it may be shaded to show more clearly where the population is thick on the ground, and where it is thin. The map in fig. 19 shows this for England and Wales in 1901, the year of the last census. The map in fig. 20 has been made by adding together all the pastoral, agricultural, and fishing people in each county,



FIG. 20. Distribution of Agricultural, Pastoral, and Fishing Population in the British Isles.

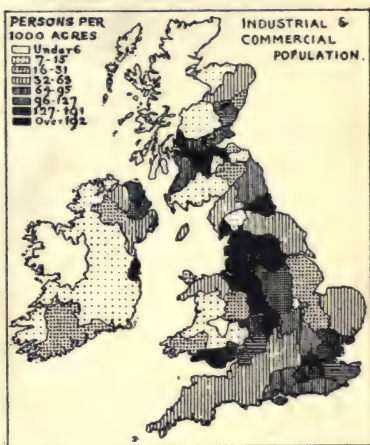


FIG. 21. Distribution of Industrial and Commercial Population in the British Isles.

and then calculating the number per 1,000 acres. This gives some idea of how the people would be distributed if there were no manufactures and commerce in Britain, and roughly shows which districts were most thickly peopled before the rise of manufactures. The south-east of England is most densely peopled; the north-west of Scotland most thinly.

Turn back again to the maps of figs. 9 and 10. The

¹ It is easy to find the number per square mile by multiplying by 640, the number of acres in a square mile, and dividing by 1,000, while for rougher calculations it is near enough to multiply by $\frac{2}{3}$.

agricultural counties are much more densely peopled than the pastoral.

Fig. 21 shows the distribution of the industrial population. It is grouped round a few centres. These centres are found in the drier east and in the wetter west, in the flatter parts of Central Scotland, and the hilly parts of Wales.

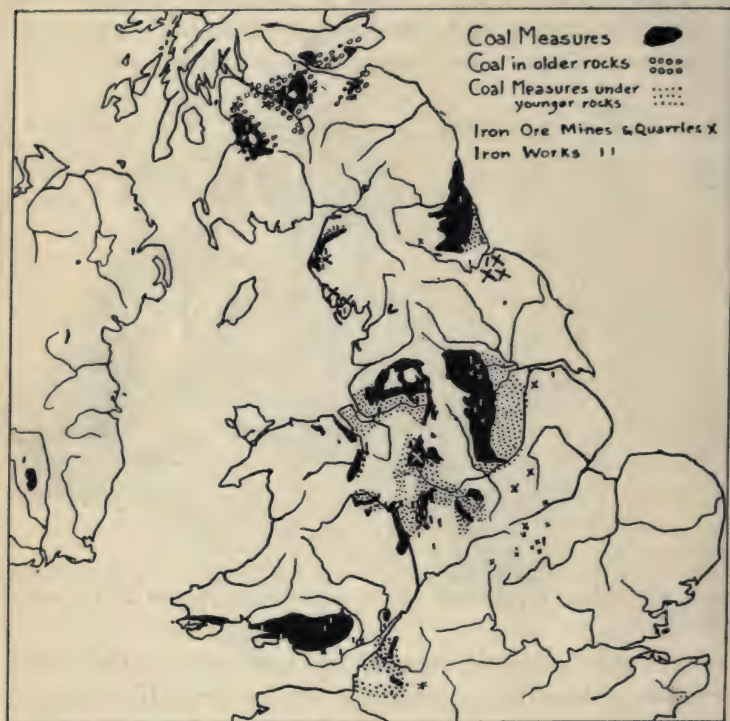


FIG. 22. Distribution of Coal, Iron Ore, and Iron Works in Britain.

Neither configuration nor climate explains the distribution of these centres.

Fig. 22 shows that coal is found in most of the darkly-coloured counties of fig. 21. Coal is used to make the steam which drives the machinery in many factories, and on the whole it is found to pay best to build the factories near the

coal-mines. The distribution of coal cannot be explained like that of climate. It is only found in limited areas, in what are called coal-fields. In Britain the chief coal-fields occur in :—

- (1) a band across Central Scotland, which is not continuous, but broken up into several basins ;
- (2) on the flanks of the Pennines ;
- (3) on the margin of the Welsh highlands in the north-east ;
- (4) in various patches in the Midlands of England.

The most important are the Scottish ; the North-east Pennine, or Northumberland-Durham field ; the South-east Pennine, or York-Derby field ; the South-west Pennine, or Nottingham and South Lancashire fields ; and the South Wales and Midland coal-fields. They are the seat of the busy manufacturing regions which lie round Newcastle, Leeds and Sheffield, Manchester and Liverpool, Cardiff and Swansea, and Birmingham and the Potteries.

Two other industrial centres require notice—that round Belfast in North-east Ireland, which is able to obtain coal cheaply oversea from Scotland, and London, which imports its coal by sea from North-east England.

Language. The same language is not spoken in every part of Britain. English is spoken by the great majority, and understood by most of those who prefer to speak another language. Fig. 23 shows in black the districts where more than half the people speak Keltic languages, which in Scotland and Ireland belong to the Gaelic, and in Wales to the Brythonic group of Keltic. Manx, related to Welsh, is spoken in the Isle of Man.

The Divisions of Britain. Politically Britain consists of the United Kingdom of Great Britain and Ireland, and the islands in British waters, of which the Isle of Man in the Irish Sea, and Jersey, Guernsey, and the smaller Channel Islands off the coast of France are the most important.

London is the capital of the United Kingdom, and also of the kingdom of England, which includes the principality of

Wales. Edinburgh is the capital of the kingdom of Scotland, and Dublin of the kingdom of Ireland. In the course of the last four centuries the United Kingdom has expanded into a great Empire overseas, of which London is the capital.

England, Scotland, Ireland, and Wales are further subdivided into administrative counties. Within these are boroughs and urban and rural districts. These are again



FIG. 23. Distribution of Keltic-speaking Population.

divided into parishes. The army, the navy, and the churches have administrative divisions differing from those of the civil administration. For the larger divisions there are obvious geographical causes. The Welsh Marches, or Border, for instance, run along the eastern border of the Welsh Highlands. The Cheviot Hills and the Solway Moss form a natural boundary between England and Scotland. Ireland is an island.

IRELAND.

Look at the map in fig. 24. The land which lies over 500 feet above sea-level is shaded, that below 500 feet is left white. A band running west-east across Ireland has hardly a height above 500 feet. North and south of this band much of the



FIG. 24. Physical Features of Ireland.

land has an elevation considerably over 500 feet. Cross-shading indicates the land over 1,000 feet high. A few solid black patches show land over 2,000 feet.

South Ireland. Beginning in the south, notice how the lines of heights run west-east. They have many names. The western parallel ranges are the Kerry Mountains, the

highest point of which is Macgillicuddy's Reeks, rising above the beautiful lakes of Killarney. These ridges run westwards to the sea and form long peninsulas, separated by bays, which become narrower and shallower towards their heads. Such bays are known as rias, and a coast of this type is called a rias coast. At the south of Dingle Bay is the island of Valentia, where the most westerly meteorological station in the British Isles gives the first warning to the rest of the country of storms coming from the Atlantic. Bear Island, lying to the north of Bantry Bay, and separated from the



FIG. 25. Physical Features of Southern Ireland. Notice Railway from Dublin to Cork.

mainland to the west by a very narrow strait, affords shelter to Bear Haven, an important naval station. Clear Island, the southern point of Ireland, is the western end of the southern range of heights. This, or the Fastnet Lighthouse to the south-west, is a signal station, where ships bound from America are first sighted and reported.

The valleys of Southern Ireland run from east to west, or from west to east between the ranges, so that the roads and railways also run east and west, as can be seen in fig. 25. The chief rivers are the Lee, Blackwater, and

Suir. They turn at right angles across gaps in the ranges, and widen out where these enter the sea—forming Cork, Youghal, and Waterford harbours. These are submerged river-mouths, or estuaries, affected by the tides. Cork and Waterford can be reached by steamers of considerable size, and are important ports, trading more particularly with the Bristol Channel. In the middle of Cork Harbour, which is much the largest of the three, is an island, formed of a part of one of the minor west-east ridges, with only narrow straits through which ships pass to the upper part of the estuary. At the south of this island is Queenstown, where Atlantic liners call with mails. These are taken by rail across Ireland, and thence by a swift steamer service from Kingston, across the narrowest part of the St. George's Channel, to Holyhead in North Wales, from whence they are forwarded by express to London. The Irish line runs to Cork, and then due northwards through a remarkable gap in the range to the north, by which, at one time, a river probably flowed to the south. At the north end of this gap is the town of Mallow. The line continues to run north, through a wider gap in the northern range, and then turns to the north-east between the highlands of Kilkenny and the Slieve Bloom Mountains, which are drawn out from south-west to north-east. It passes through Maryborough and Kildare, from the former of which a line runs southwards down the Nore valley, through Kilkenny, near the small coalfield of Castle-comer to Waterford. From Kildare, near which is the Curragh Camp, a line runs southwards down the Barrow to Wexford. The Nore and the Barrow unite before they are joined by the Suir, the upper part of which also flows from north to south until, after passing the hill-town of Cashel, it is turned eastwards by the Knockmealdown Mountains. Clonmel is built on its banks a little below this bend.

The Wicklow Mountains, with deep and beautiful glens, and a few picturesque tarns, or small mountain-lakes, are the highest mountains in the east. The beautiful Vale of

Avoca, or Ovoca, and the upper courses of the Liffey and Slaney, are in these mountains. Wexford, on the estuary of the Slaney, is a fair harbour. It is proposed to run steamers from Rosslare, outside the harbour, to Fishguard, in Wales. Wicklow and Bray are two of the many picturesque tourist resorts which lie at the foot of the Wicklow Mountains.

The lowlands of the eastern part of Southern Ireland are the warmest part of the country in summer and the most fertile (see figs. 16 and 9). The inland towns are market centres, as everywhere in Ireland, except in the north-east. They are somewhat larger than those in the centre and north-west.

Central Ireland. The Central Plain extends from the mouth of the Shannon, Galway Bay, Loughs Mask, Corrib, and Conn in the west to the east coast between Dublin and Dundalk Bays. It is very largely composed of porous limestone, which is easily worn into hollows. These hollows are filled with shallow waters, of which the three western loughs just mentioned, and those along the course of the Shannon, are the most important. Caves are common, and the river draining Lough Mask to Lough Corrib flows underground. The chief port is Galway, at the mouth of the Corrib, on Galway Bay, which is sheltered by the Aran Islands.

Look at the population maps (fig. 29), and notice how few people there are in this part of Ireland. This explains why Galway is not a larger town.

The Shannon rises in the south of the hilly northern land, the first lough, Allen, being almost entirely surrounded by hills. The river runs south, receiving a tributary from the west, which flows through two considerable lakes. Carrick-on-Shannon is built opposite the confluence. The Shannon widens to form Loughs Ree and Derg, Athlone lying at the southern end of Ree, and Killaloe at the southern end of Derg. Look carefully in fig. 26 at the district round Killaloe. The river flows with a rapid course in a somewhat

narrow valley between the Slieve Bernagh and the Silvermine hills. Measure from the north of Lough Allen to the southern end of Lough Derg. The height of Lough Allen is 168 feet above sea-level, and that of Lough Derg 108 feet. The river, therefore, falls 60 feet in some 80 miles, or about 9 inches to a mile. After leaving the hills it begins to widen out into a great estuary, at the beginning of which is the city of Limerick. Notice that at Limerick the river is at sea-



FIG. 26. Physical Features of the Shannon Basin and the Central Part of Western Ireland.

level, or over 100 feet lower than Lough Derg. Measure the distance from Killaloe to Limerick. In this hillier portion of its course the river falls 100 feet in 20 miles, or about 60 inches to a mile—that is to say, about seven times as rapidly as above the hills. Why should the river cross this hilly land when, as the map shows, there are much less hilly routes to the sea? The simplest answer is that these hills have been formed by the wearing away of the land

round them since the river first took its southward course across this district. This process of wearing down must have taken many thousands of years. This reminds us that the surface of the land is always being very gradually altered by rains and rivers, and that something of its past history may be learned by looking carefully at its present features.

The Shannon receives a number of tributaries on both banks. The Suck is the most important on the right, or west bank; while the largest on the left, or east bank, is the Brosna. Both of these enter the main stream between Loughs Ree and Derg. The estuary of the Shannon is long and narrow. Measure its length from Limerick to the sea. There is one large opening in the north, the estuary of the Fergus, the river on which Ennis is built.

On the flat surface of the plain, which in many parts has a surface-covering of thick boulder clay, shallow water accumulates, and in the marshy surface sphagnum moss and other bog plants grow abundantly. These form the well-known Irish Bogs, which cover large areas, especially in the west. The largest bog in the east is the Bog of Allen, not to be confused with Lough Allen. Sometimes a bog becomes so logged with water that it begins to slide from its clayey foundations, and sweeps away roads and even houses. When a bog is drained, the moist mass of moss and other vegetation is cut out and dried. This is known as peat, or turf. Peat makes excellent fuel, which is largely burned in Ireland. A process has been discovered for making it into briquettes which burn better than ordinary dried peat. It can also be used for litter, and is even manufactured into paper.

Bogs are also found in the hollows of hills composed of old hard impervious rock, through which water cannot penetrate. Bogs of this kind are found in Great Britain, as well as in Ireland.

From the Shannon to the east coast there is little land over 300 feet high, and the water-partings and divides between

the different river basins are not well-marked. The lower Liffey and the Boyne are the chief rivers flowing east. At their mouths are the cities of Dublin and Drogheda. From Dublin two canals cross this flat land. The Grand Canal runs due west through Tullamore, and follows the Brosna to the Shannon. The Royal Canal passes west-north-west through Mullingar to the same river above Lough Ree. The main railway to the west takes the same course to Mullingar and passes thence by Athlone to Galway. From Athlone a line runs north-west through Roscommon to Westport. A line from Mullingar passes by Longford to Sligo. These inland towns are all small country market centres. The north line follows the coast from Dublin through Balbriggan, a small manufacturing town making poplins, Drogheda, and Dundalk. (For navigable rivers and canals, see fig. 27.)

The east coast ports have not good natural harbours, but as they lie in the more densely populated part of the country opposite Great Britain, they are far more important than the western ones, which have a poorer hinterland, and are farther away from Great Britain and the continent. Dublin is the most important. It lies almost in the centre of the east coast, on a fine bay, and is in easy communication by road, railway, and canal, with all parts of Ireland. It is much nearer than Drogheda to the Welsh coast, at a point where that coast is near the Cheshire Gap, between the Welsh and Pennine Highlands, through which there is easy communication with all parts of England. For the fastest



FIG. 27. Navigable Waterways of Ireland

services the port of Kingston, at the south-east end of Dublin bay, is used, from whence mail-steamers sail to Holyhead, on the small Holy Island to the west of the island of Anglesey. The position of Dublin has helped to make it important as an administrative centre, especially since the English occupation. It is the capital of Ireland, and the



FIG. 28. The Chief Routes in and to Ireland.

residence of the Lord Lieutenant, who represents the King in Ireland. It is also the seat of the High Courts, the chief administrative offices, and the most important universities in Ireland. As an industrial centre it is chiefly noted for its distilleries, and for the manufacture of poplins.

Northern Ireland. The mountains of Northern Ireland are not arranged in well-marked parallel bands, as in the

south. On the whole they run in a south-west to north-easterly direction, but never for any great distance. They are older and more rugged than the southern mountains, except in the east, where they are composed of young volcanic rocks. Wide passages lead between them from the Central Plain to the sea.

West of Loughs Mask and Corrib are the picturesque mountains of Connemara, forming part of the broad peninsula between Galway and Clew Bays. Westport, on Clew Bay, is the chief town at the end of one of the lowland passages from the Central Plain. The northern part of Connaught, as this part of Ireland is called, is divided into the Mayo or Nephin Beg Highlands and the Sligo Highlands by a similar passage, with Lough Conn in the centre, and Killala Bay in the north. A narrow strait separates the Mayo Mountains from the Achill Islands, the largest and most picturesque of Irish islands, in which Achill Head rises 2,200 feet out of the sea.

At the end of the passage between the Shannon and Sligo Bay is Sligo, to the east of which is another series of groups of hills, bounded on the east by the river Erne. This river widens out for half its course into lakes, of which Upper and Lower Lough Erne are the chief. Enniskillen is built at the head of Lower Lough Erne, and Ballyshannon at the mouth of the river, where it flows into Donegal Bay.

The Donegal Highlands are among the wildest in Ireland, with long south-west to north-easterly valleys. The coast is also rugged, forming great cliffs, and cut by inlets, of which Lough Swilly is the largest. Lough Foyle is the end of the lower ground in the east drained by the Foyle. Londonderry, a linen-bleaching, shirt-manufacturing town, stands at the mouth of the Foyle, and Movile, at the entrance of the lough, is a port of call for Atlantic liners. A railway runs through the lowland gap up the Foyle by Strabane and Omagh, where it branches to the south-west and south-east, the latter line going to Dundalk and Dublin.

East of the Foyle a circle of highlands surrounds a flat

basin in which are gathered the waters of Lough Neagh, the largest lake in the British Isles. From this basin four strips of lowland radiate, dividing the highlands into the Sperrin Mountains in the north-west, and the heights of Armagh in the south-west, both old worn-down mountains. The volcanic Mourne Mountains lie in the south-east, and the lowlands beyond are partly covered by Strangford Lough. The lava-covered tableland of Antrim lies in the north-east. The south-west gap is drained by the Blackwater and the southern one by the Bann, both flowing to the square-shaped Lough Neagh. The Bann flows through this lough, and then crosses the wider northern lowland to the sea, with Coleraine at its mouth. The seaward end of the southern gap is drained to Carlingford Lough, and that of the eastern gap by the Lagan to Belfast Lough.

All these gaps are used for canals and railways. The Ulster Canal goes south-west by Monaghan to the Erne and the Shannon. The Newry Canal passes south through that town to Carlingford Lough, and by this gap the main line from Dublin and Dundalk and the railway from Greenore, which communicates by sea with Holyhead, reaches Portadown, where the line divides, the north-west branch going to Londonderry, and the other through Lurgan and Lisburne to Belfast. The old town of Armagh, in the south of the flat basin, is the seat of an archbishopric of the Episcopal Church of Ireland. Some coal is found at Dungannon. The towns of East Ulster manufacture linen from the flax grown in the district. The fine quality of their linens is largely due to the great excellence and purity of the waters of the rivers which are employed in the bleaching. Belfast is by far the most important industrial and commercial centre in Ireland. This it owes in great part to its convenient position opposite the coal-districts of Scotland and Northern England. Ship-building and the manufacture of linen and machinery are important. Belfast is in direct communication with Glasgow, Barrow, Fleetwood, Morecambe, and Liverpool. The shortest

sea route between Ireland and Great Britain is between Larne, on the lough of the same name, connected with Belfast through Carrickfergus by a short railway, and Stranraer, at the head of Loch Ryan in Scotland, a distance of only 41 miles. A still shorter crossing, from Donaghadee to Portpatrick, which is only $21\frac{1}{2}$ miles, or about that of the Channel between Dover and Calais, cannot be used for regular traffic,

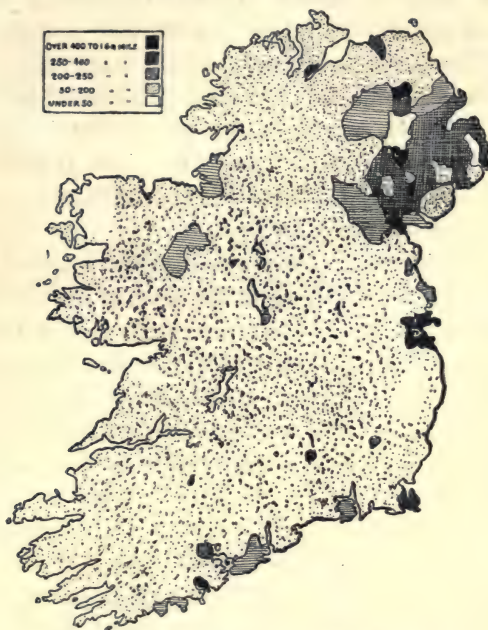


FIG. 29. Density of Population in Ireland.

as heavy seas prevent any permanent harbour works at Portpatrick. (For canals see fig. 27 ; for railways fig. 28.)

A number of seaside resorts are found round the coast. Newcastle, at the foot of the Mourne Mountains, and Portrush, in the north of Antrim, may be mentioned. The cliffs of Antrim are very picturesque, with black basaltic lava lying over white chalk. Here and there the basalt has cooled in columnar masses, which form magnificent amphitheatres in

the cliffs near Portrush, and the celebrated Giants' Causeway further east.

Look at the map in fig. 29, which shows the distribution of population. It is greatest in the north-east, and greater round the coast than inland. This is because the industrial region is in the north-east, and because the inland towns are only small market towns. Ireland is essentially a pastoral or stock-raising country, which, as we have seen, never means a very dense population. Nor are there important deposits of coal or other useful minerals to create manufacturing towns with a dense population. In the highlands of the far west much of the soil is poor, and the population is scanty and ill-fed. In some of these poor districts the coasts are bordered by steep cliffs, so that the inhabitants are unable to eke out their resources by fishing.

Ireland is divided into four provinces, which were formerly separate kingdoms. Connaught lies west of the Shannon and north of Galway Bay. Munster is composed of the land to the south as far as Waterford Harbour and the upper Suir basin. Ulster lies north of a line from Donegal Bay to Carlingford Lough. Leinster, composed of the old kingdoms of Meath and Leinster, lies south of this line, and east of Connaught and Munster.

SCOTLAND.

Look at the map in fig. 33. The Border, the boundary between England and Scotland, is formed by the Solway Moss, the Cheviot Hills, and the lower Tweed. This boundary is, on the whole, a natural one, difficult to cross, and, even to-day, thinly peopled. In Scotland three physical divisions are well marked—the Highlands, the Central Lowlands, and the Southern Uplands. Comparing the physical maps of Scotland and Ireland (figs. 24 and 31), which are shaded in the same way, it will be seen that the hilly lands of Scotland are much more extensive and continuous and, on the whole, much loftier than those of Ireland, while the

lowlands are smaller, more broken by hills, and penetrated by deep estuaries. The highlands are highest in the west, while the plains are more continuous on the east. The short steep slope of the land is to the west, the long and gentle slope to the east. Scotland turns its back on the Atlantic, and opens to the North Sea and the continent of Europe. The Firth of Clyde is the only great river opening to the west, but it has been of the greatest importance.

The Scottish Highlands. Separated from the mainland by the broad Minch lie the outer Hebrides. On the map these look rather like a kite, the head of which is the Lewis, and the tail a string of islands, of which North and South Uist are the largest. They consist of bare, rounded hills, covered with boulder clay, in the hollows and rock basins of which are innumerable lakelets. The climate is mild and wet. The soil is infertile, and often boggy, yielding neither good agricultural nor good pasture land. The inhabitants are as much fishermen as farmers, and on most of the islands make but a poor living. Stornoway, on the Lewis, is the only considerable town, and the chief fishing-station.

The volcanic islands of Skye, Rum, Eigg, and Mull, with the peninsula of Ardnamurchan, the westernmost part of the mainland of Great Britain, were probably formed at the same time as the Antrim rocks (see fig. 30). Here, as in the north of Ireland, are wonderful amphitheatres of columnar basalt. The pillars of the roof of Fingal's Cave, in the small island of Staffa, off Mull, are of the same formation. The rugged Coolin Hills of Skye, with their deep corries, or niches, in the slopes of the hills, often containing picturesque tarns, and their deep glens strewn with boulders, through which rush torrents fed by the heavy and frequent rains, form one of the most beautiful mountain districts of the British Isles. The islands near the mainland are called the Inner Hebrides. In addition to those already mentioned notice Jura with its two conical hills and the low-lying boggy Islay. Portree in Skye is a fishing-centre.

The whole of the west coast of the mainland is penetrated by long winding valleys, shut in between mountain walls on either side. These valleys have been drowned by the sea, often for many miles inland, forming fiords, or, as they are called in Scotland, firths. They are also sometimes called sea lochs, as, for example, Loch Linnhe. The unsubmerged parts



FIG. 30. Physical Divisions of Scotland.

of the valleys often contain long narrow lakes of great beauty, such as Lochs Morar and Maree. Communication in this part of Scotland is very difficult. Only two railways reach the coast north of Mull, one at Mallaig, on Loch Nevis, at the south end of the Sound of Sleat, between Skye and the mainland, the other at the Kyle of Lochalsh, at the north end

of the Sound. Strome Ferry, on Loch Carron, is a port near the end of the northern line. To the ends of these lines the produce of the western fisheries is brought and dispatched by



FIG. 31. Physical Features of Scotland and Northern England.

express trains to the east and south. The short but busy tourist season adds greatly to the prosperity of this part of Scotland. (See fig. 31, with the map of Scotland in any atlas.)

The eastern slope of the North-west Highlands also contains long, narrow lakes. The land is but little cultivated, and the population is diminishing, owing to the turning of sheep-farms into deer-forests. These deer-forests are bare moors over which the deer wander. They are valued only for the sport they afford in autumn to rich men from the south. Along the east coast the land is more fertile, and small towns are found at Beaully, on the Beaully Firth, Dingwall, on Cromarty Firth, Dornoch, and Tain, on the Dornoch Firth.

The extreme north-east recalls the north-east of Ireland. It is a tableland, with steep cliffs, but these are of red sandstone instead of basalt. Thurso, on the north coast, and Wick, on the east coast, are the most northerly towns on the mainland. Both are important fishing-centres, full of bustle during the herring season. No Gaelic is spoken in this north-easterly part of Scotland (see fig. 23). The inhabitants are closely related to the Scandinavians, as are those of the Orkney and Shetland Islands, which lie to the north of Scotland. Kirkwall, the capital of the former, and Lerwick, the capital of the latter group, are both fishing-centres. The cliffs in the Orkneys are formed of the horizontal red sandstones of North-east Scotland. One great pillar, some 450 ft. high, is called the Old Man of Hoy. The Pentland Firth, between the Orkneys and the mainland, is extremely stormy and dangerous. The tides race through this narrow channel between the Atlantic Ocean and the North Sea, at a rate of 6 to 10 miles an hour, forming dangerous eddies and whirlpools.

The remarkable long, narrow valley of Glen More¹, or the Great Glen, runs from the Moray Firth south-west to the Firth of Lorne. This valley is clearly shown in the map in fig. 32. Two long, deep, narrow lakes, Lochs Ness and Lochy, occupy about three-fifths of its floor. From Loch

¹ More, from a Gaelic word, 'mor,' meaning 'great,' is found in such names as Glen More, 'the great glen'; Ben More, 'the great mountain'; and Strathmore, 'the great vale.'

Ness the Ness river flows to the north-east, and from Loch Lochy the Lochy flows to the south-west. Canals have been cut between these lochs and the sea, forming a great waterway across Scotland from sea to sea. It is called the Caledonian Canal, and allows vessels of considerable tonnage to pass from east to west without facing the dangerous passage of the Pentland Firth. Inverness¹, at the north end, is regarded as the capital of the North Highlands. Fort Augustus, in the centre of the Canal, at the south end of Loch Ness, and Fort William, at the southern end, at the mouth of the Lochy, have grown in importance with the development of the Canal. Oban, on the mainland, opposite Mull, is at the southern end of Loch Linnhe. Steamers sail from it in all directions. This explains why it is the chief town of the West Highlands.

The country to the east of Glen More is the highest and most rugged in Britain. Three river systems should be traced on the map, the Spey, the Dee, and the Tay. The Spey opens to the north-east, and has a wide vale in the centre, with the Monadhliath² Mountains on the west, and the Cairngorm Mountains on the east. The Cairngorm and the Lochnagar or Balmoral Mountains, with rounded summits and deep corries, completely surround the upper Dee, so that it is exceedingly difficult to pass from the Dee valley to the valley of the Spey or of the Tay.

Immediately to the east of Loch Linnhe are lofty mountains, rising in Ben Nevis to over 4,400 feet—the highest point in Britain. Deep valleys, cut by rushing torrents, open to the west, the most impressive in its wild and gloomy beauty being the Vale of Glencoe. To the east is the vast desolate Moor of Rannoch, with its heather moors, peat mosses, and lonely lakes. A series of long, picturesque valley lakes, Lochs Ericht and Rannoch drained by the Tummel, Loch Tay

¹ 'Inver' and 'Aber,' both meaning 'at the mouth of,' are found in many Scottish place-names.

² Pronounced Monalia. 'Liath' is the Gaelic word for 'grey.'

by the Tay, and Loch Earn by the Earn, lie in the western part of the Tay basin. The passage from the Tay to the Spey basin is not difficult, the most important pass being that of Dumvochter, through which the main line from Inverness, after crossing the northern part of the Monadhliath Mountains passes to the Garry valley. The most difficult part of this route is not at the divide, but where the Garry flows through the narrow gorge or pass of Killiecrankie. Kingussie, Blair Atholl, and Dunkeld are the chief of the small towns on this picturesque route. (See fig. 33, and compare with fig. 31.)

Along the north-eastern and southern margin of these south-eastern highlands the towns or villages are built either where the valleys open to the plain or where the rivers reach to the sea. The southern margin of these highlands, which stands out as a well-marked wall above the plain, is generally called the Grampian Mountains. There is little cultivation, but a fair amount of sheep farming, for which these high bleak pastures are better adapted than for the plough. Vast areas are preserved for game, either deer or grouse, and the whole region is very thinly populated, with hardly a town of any considerable size. The marginal plains are fertile, especially in the dry area, south of the Moray Firth.

From Inverness the railway runs eastwards to Elgin, where it leaves the coastal plain, and crosses the north-eastern spurs of the highlands to Aberdeen, passing on the way through Huntly. Fraserburgh and Peterhead, north of Buchan Ness, as well as Aberdeen, are important fishing- and fish-curing centres. Aberdeen is built where the Dee and Don valleys converge, and where the margin of the highlands reaches the east coast, leaving only one route to the south. Notice in the map in fig. 33 that there are three railways radiating west, north-west, and north. The granite of the highlands is quarried at Aberdeen and at Peterhead, close to the sea, and can be cheaply shipped to London and other east-coast

towns. This map does not show the other towns built at valley-mouths in this region of the highlands. Most of them have small manufacturing industries or are important as summer resorts. Crieff and Callander are built at important



Above 600 Ft.

FIG. 32. Lowlands and Highlands of Scotland between the Moray Firth in the North and the Southern Uplands in the South.

openings to the southern part of the highlands. From Callander the railway passes along steep hill-sides and over bleak passes to Oban. A still more remarkable line runs from Glasgow to the north-west. It enters the highlands at

Helensburgh, and passes north through some of the most imposing scenery in Scotland, by Lochs Long and Lomond, the Moor of Rannoch, and Glen Spean, to Fort William and Fort Augustus, with an extension to Mallaig on the Sound of Sleat. From Callander a coach-route runs through the Trossachs to Loch Katrine, which is crossed by steamer, and the tour is continued by coach to Loch Lomond. This is one of the most beautiful routes in Scotland, and is frequented by thousands of tourists every summer. A fine description of the district will be found in Sir Walter Scott's poem, *The Lady of the Lake*. The south-western end of the highlands is penetrated by long fiords and narrow sounds, with here and there fishing-villages crowded by visitors in summer. The most important towns are Rothesay, on the Island of Bute, with a noble bay, and a matchless view of the sea and mountains, and Inverary at the head of Loch Fyne. The long peninsula of Kintyre would become two islands if the sea rose sufficiently to cover two low isthmuses. The Crinan Canal has been cut across one of these from Crinan on the west to Ardrishaig on Loch Fyne. Campbelltown, on the south, is noted for its distilleries. The large and picturesque island of Arran lies in the gulf between Kintyre and the mainland.

The Central Lowlands. The Central Lowlands resemble the hillier not the central parts of Ireland. An almost continuous fertile valley, Strathmore, or the Great Vale, lies at the south-east of the Grampians. South of it is a belt of hills of considerable height, but lower than the Grampians (see fig. 32). This is broken up by transverse valleys into four masses. The Tay makes its way between the Sidlaw and Ochill Hills to its estuary, or firth, after receiving the Isla and the Earn from Strathmore. The united waters of the Forth and Teith flow across a wider plain in great windings, called the Links of Forth, to the Forth estuary, which also opens to the east. The third gap, which lies between the Campsie Hills and the Renfrew Heights, is

crossed from the south by the Clyde, with an estuary opening to the west. Important routes run through each of these gaps, in which towns have grown up. Perth, on the Tay, Stirling, on the Forth, Dunbarton and Greenock, on the Clyde, are all situated in these gaps. Until recent years there was only one easy route to the north, by Stirling and Perth. The bridging of the Forth estuary at Queensferry by the Forth Bridge, and of the Tay estuary at Dundee, by the Tay Bridge, has made a shorter route farther to the east. Dundee, and the fishing-towns of Arbroath and Montrose, to the east of the Sidlaws, manufacture hemp and flax into ropes and sail-cloth. Half a century ago, when the Crimean War cut off the Russian supply of hemp, Dundee manufacturers began to import jute fibre from India. Dundee is now the centre of the jute manufacture, which produces bags, carpets, curtains, and decorative fabrics, of fine appearance but poor quality.

The hilly peninsula of Fife, cut off from the rest of Scotland by the estuaries of the Forth and Tay, and the Ochill Hills, early became settled and flourishing. The chief towns are round or near the coast, which is the richest part. For this reason a Scottish king called Fife 'a beggar's mantle with a fringe of gold.' Cupar, the administrative capital, is an inland town, but St. Andrews, an old ecclesiastical centre, a university town, and a great golf and holiday resort; Kirkcaldy, with its linoleum manufacture; Dunfermline, an ancient Scottish capital, now engaged in linen manufacture, are all on or near the coast, which is fringed with little fishing-towns, crowded with visitors in the holiday season.

Another line of lower land runs north-east to south-west from the Firth of Forth to Ayr Bay, south of the Campsie and Renfrew Hills (figs. 31, 32, 34). This strip of lowland between the Forth and the Clyde, which permits easy communication between east and west, is not only fertile, but is also one of the richest coal-fields in the British Isles. Two masses of higher ground, the Lanark Moors in the west, and the Pentland Hills in the east, occupy most of

the southern part of this district, leaving three basins. These contain three coal-fields—the West, or Ayr coal-field; the Central coal-field stretching from the Clyde across the upper part of the Forth estuary, through Lanark, Stirling, and Clackmannan; and the Eastern coal-field, on both sides of the middle of the Forth estuary, in Fife and Midlothian. These coal-fields are close to the sea, and the iron and limestone required for iron-smelting are found beside them. Study carefully the map in fig. 22. Kilmarnock, an engineering centre, is the chief manufacturing town on the Ayr coal-field. The coast towns, Ayr, Troon, &c., are engaged in shipping Ayrshire coal to Belfast, and other ports. Glasgow is the centre of the Lanark coal and iron district. It is by far the largest and wealthiest city in Scotland. As the centre of a densely populated district it rivals Liverpool and Manchester, and is surpassed only by London. It is an old city, and owes its growth largely to its position where the line of lowland already mentioned crosses the Clyde at the highest point to which the tides reach. The deepening of the river to accommodate modern ocean-going vessels, has made Glasgow a very important port, and a great ship-building centre. Local coal, iron, and timber are easily brought to its wharves at a low cost. The Clyde is now one of the greatest ship-building areas in the world, Glasgow, Port Glasgow, Dunbarton, and Greenock being the chief towns thus engaged. Several lines of railway radiate from Glasgow. One goes down the Clyde to Greenock, and another through the Beith Gap by Paisley and Dalry to Ardrossan, both of these improving its communication with the west. A third goes to Grangemouth on the east coast, on the estuary of the Forth, bringing Glasgow into communication with the North Sea and Baltic ports. A ship canal across this isthmus of lowland would give Glasgow water communication with the North Sea. At first it would chiefly benefit the great manufacturing towns of the west, by giving them an outlet to the ports of Europe, but it would soon increase the prosperity of the whole of

Southern Scotland. Measure on the map the length of such a canal. Among the mining and engineering centres of the south-western part of the Central coal-field are Airdrie,



FIG. 33. Main Routes in the Northern Half of Great Britain.

Coatbridge, and Motherwell in the south-west, and Falkirk in the east. Glasgow also manufactures chemicals, and Paisley has the largest cotton and linen thread factories in the kingdom.

On the Fife coal-field the linen manufactures of Dunfermline, and the linoleum manufacture of Kirkcaldy, have already been mentioned. Coal is shipped from Kirkcaldy and Burntisland. Edinburgh is the chief city south of the Forth. It originally grew up round a lofty and precipitous rock, which has long been strongly fortified, commanding the narrow passages east and west between the Pentland Hills and the sea. Its excellent waters, fed from these hills, have made its brewing and distilling famous. It is the administrative, ecclesiastical, and intellectual capital of Scotland. Of the four Scottish universities, Glasgow, Aberdeen, St. Andrews, and Edinburgh, the latter is the most important, and it is also one of the most famous medical schools in the world. It is a great printing centre, the paper used being manufactured in the valleys of the neighbouring streams, particularly along the Water of Leith, and the Midlothian Esk¹. The port is Leith, but the two are in reality one continuous town. Dunbar, in the east of the fertile and highly cultivated district of East Lothian, is built where the East Coast route is confined between the Southern Uplands and the sea. (See fig. 34.)

The Southern Uplands. The Southern Uplands form a continuous line of heights running from south-west to north-east, with a few cross valleys. In the south the rivers descend to the Solway Firth in the west, and to Tweeddale, or the Vale of Tweed, in the east. A mass of high ground separates these two lowlands, and joins the Southern Uplands to their eastern extension, the Cheviot Hills. (See fig. 34.)

The Southern Uplands are rounded hills, with heather moors and peat mosses in the higher parts, and grass slopes in the lower parts. The valleys, or glens, alternately contract and widen out into fertile stretches of flood plain, or haughs. The wider valleys of the lower parts of these rivers, especially of the Tweed, are very fertile. Sheep farming in the hills and mixed farming in the valleys are the chief occupations.

¹ Esk means 'water,' and is a common river name. Usk and Ouse are forms of the same word.

Tweeddale, surrounded by hills, has long been a centre of considerable wealth and population. This is shown by the number of fine ruined abbeys, Melrose, Dryburgh, Kelso, and Jedburgh, destroyed in the Border wars. The water-power has given rise to numerous small manufacturing towns in the valleys, especially in the Tweed valley, where tweeds and hosiery are manufactured. Peebles on the Tweed, Galashiels, on the Gala, Selkirk on the Ettrick, Hawick on the Teviot, all tributaries of the Tweed, Langholm on the Border



FIG. 34. The Southern Uplands of Scotland and the Lowlands which border them.

Esk, and Dumfries on the Nith, should be looked out on the map, and the railway routes through them traced.

The main routes across the Southern Uplands are (1) that in the extreme east, where the Lammermuirs reach the sea. Here the East Coast route passes south from Dunbar to Berwick-on-Tweed, which for administrative purposes is included in England; (2) those which converge at the end of the Solway Firth, and meet at Carlisle, on the Eden, in England. (See figs. 32, 33, 34.)

There are two routes from Edinburgh to Carlisle, one by

the Gala, Tweed, Teviot, and Liddel valleys, passing Galashiels, Melrose, and Hawick, and crossing the hills twice; the other to the west of the Pentlands, up the Clyde, over Beattock Summit, and through Annandale to Lockerbie. The routes from Stirling and Glasgow meet this Beattock route at Carstairs, on the Clyde. A western route from Glasgow runs by Kilmarnock through the Nith valley, which cuts



FIG. 35. Density of Population in Scotland and the extreme North of England.

completely across the Southern Uplands. The short sea route to Ireland passes east from Stranraer through the district of Galloway to Castle Douglas, Dumfries, and Carlisle.

Population. The density of population, as shown by the map in fig. 35, shows how little of Scotland is at all well peopled. Most of that small population is concentrated into the central belt of the Central Lowlands and the eastern coastal plains.

Edinburgh, with its easy communications by land and sea, is consequently a very well-placed capital. Hardly any important town, except Aberdeen, Inverness, Oban, Greenock, Ayr, and Dumfries, is more than 50 miles distant, and the last three are only just over 60 miles away. This concentration of the population does much to give Scotland its well-marked national unity.

ENGLAND AND WALES.

Northern England. Northern England extends southwards from the Scottish Border to a line joining the Dee and the Wash. The Pennine Uplands form a continuous belt of uplands running north-south, with a lowland on either flank. Fig. 36 shows the higher ground in black. Notice the Tyne Gap, which separates the Pennines from the Southern Uplands of Scotland, and the Aire Gap, which divides the Pennines into a northern and a southern mass. The northern mass is joined on the west to the English Lake district. Beyond the eastern lowlands in the centre and south rise the Yorkshire and Lincolnshire Heights.

The English Lake district recalls the Scottish Highlands in its high mountains—Scafell, the highest point of England, is 3,160 feet high—and its deep valleys with their mountain-torrents and long narrow lakes. These valleys and lakes radiate like the spokes of a wheel. Derwentwater and Bassenthwaite once formed a single lake, which the river Derwent entered from the east. The mud, sand, and gravel deposited by the river gradually rose above the waters of the lake, and the river then passed in several channels, or distributaries, over this newly formed flat land to the lake. Round the mouth of each of these distributaries new land was formed in a similar manner, the whole gradually forming a fan-line extension of land into the lake. At last the newly formed land reached the opposite side of the lake, which was thus divided into two smaller ones. All lakes entered by rivers tend to be gradually filled up in this way. As a rule

the main river enters at the head of the lake, and a plain slowly extends down the lake. This plain is clearly seen in



FIG. 36. Lowlands and Highlands of Northern England. The Pennine Range extends from North to South.

most of the lakes previously mentioned. Their formation is similar to that of river deltas already described.

The arrangement of lakes and valleys has just been com-

pared to a wheel. Of the spokes we may notice Derwentwater, Bassenthwaite, and the river Derwent, in the north-west ; Wastwater, at the foot of Scafell, and the Irt, in the south-west ; Coniston and Windermere, the latter drained by the Leven, in the south ; and Ullswater, drained to the Eden, in the north-east. The Lake District is a great holiday resort, in which Keswick, on Derwentwater, and Ambleside, on Windermere, are the chief centres.

Coal crops out on the western margin. Maryport, in the north, Workington, in the centre, and Whitehaven, near St. Bees head, in the south of the coal-field, export coal. The south has rich deposits of a very pure iron ore, which has made Barrow a great ship-building centre. From Barrow, which is sheltered by Walney Island, steamers sail regularly to the Isle of Man, and Ireland. The shallow Morecambe Bay forms the southern limit of the Lake District, as the Solway Firth forms its northern limit.

The Vale of Eden on the east is cut between the Lake District and the Pennines. Carlisle is built on the plain not far from its mouth, opposite the Tyne Gap. It controls the west coast routes, which must go round the head of the narrow Solway Firth. It is consequently a great railway centre. (See figs. 33, 34.)

The North Tyne comes from the west end of the Cheviots, the South Tyne from the north end of the Pennines, flowing due east. Smaller rivers drain the eastern slopes of the Cheviots, each with a town near its mouth, as, for instance, Alnwick, on the Aln. The Wear and the Tees both flow eastward from the southern part of the Pennines, each with a number of important towns on its banks, which may be looked out in a large map of the district.

The north-east coal-field has led to a very rapid growth of population in this district during the last century. Trace it on the map in fig. 22, from the mouth of the Coquet to the middle course of the Tees. As this field is on the coast much of its coal is exported by sea to London, and the

North Sea and Baltic ports from Blyth, and the Tyne ports, North and South Shields, and Newcastle, Sunderland, at the mouth of the Wear, and Hartlepool and Middlesborough, at the mouth of the Tees. Iron ore is found in the Cleveland Hills of Yorkshire, which has made Middlesborough grow rapidly. So important have the iron industries become in this district, where ships are built for all parts of the world, that the large local supply has to be supplemented by imported ore. Great modern guns are made at or near Newcastle. Darlington and Stockton-on-Tees have important locomotive and other engineering works. Salt is found in Durham, and has given rise to chemical industries at Newcastle. Durham is an old-world town, picturesquely built on a high mound, round three sides of which the Wear flows, with a university and a famous cathedral.

The Northern Pennines are about the same height as the Southern Uplands, and have heather moors, peat mosses, grassy slopes, and cultivated valleys, or dales. The long slope is to the east, and so, south of the Tees, the Swale and Ure, Wharfe, and Aire flow east or south-east. They turn south on reaching the lowland to the east, which is called the Vale of York, and below the junction of the Swale and Ure the main stream is known as the Yorkshire Ouse. The Ure valley, called Wensleydale, is followed by a railway which crosses the Pennines, the only one between the Tyne and Aire Gaps, except that which climbs to 1,400 feet between the Tees and Upper Eden, connecting the north-east coal-field with the Barrow iron centres. (Figs. 36, 37.)

The Vale of York is a rich, agricultural land, between the Pennines and the East Yorkshire heights, with the ancient town of York, on the Ouse, in the centre. This is the natural capital and market centre, and is the ecclesiastical metropolis of the north of England. Its old walls and many Roman ruins still remain, and it possesses a fine cathedral. To the east of the Vale of York are the higher and more extensive North Yorkshire Moors, ending in the north in the Cleveland

Hills and the lower rounded chalk-hills of the Yorkshire Wolds. Both end in cliffs to the east, the chalk jutting out to form Flamborough Head. Numerous fishing villages and watering places have been built where the opening of river



FIG. 37. Physical Features of Southern Part of Great Britain.

valleys to the sea form small harbours, and give access to the shore. Notice particularly Whitby and Scarborough. Between the Yorkshire Moors and Wolds is the broad Vale of Pickering. Notice that the river which drains it, the Derwent, rises near the sea, and flows inland to the York-

shire Ouse. It originally flowed the other way, but a great ice-sheet left a moraine, which blocked up the original end of the valley, and formed a lake in Pickering, with an outlet to the Ouse by the course the present river follows. South of the Humber the limestone and chalk heights are continued in two parallel bands, running north-south, known as the Lincoln Edge or Heights, and the Lincoln Wolds, separated by a plain. The river Wytham has a remarkable course.



FIG. 38. Basins of Yorkshire Ouse and Trent.

It first flows northwards in the plain to the north of the Lincoln Edge, down which it passes in a narrow gap, where the cathedral town of Lincoln has been built. It then turns south in the plain between the Edge and the Wolds, which gradually open out to the Wash in the south. The eastern part of Lincoln is a flat plain.

The fertile Vale of Nottingham lies between Lincoln Edge and the Southern Pennines. The Trent, which has come eastwards round the south end of the Pennines, flows north across it to the Humber. (See fig. 38.)

The Aire is the most important of the east-flowing rivers. It is not turned to the south, but at its confluence with the Ouse the united river flows east, and the drowned lower part of the valley forms the estuary of the Humber. With its tributary, the Calder, it flows through the northern part of the south-eastern Pennine coal-field. Many towns engaged in the woollen manufacture are built on or near it. Leeds, the most important, Bradford, Halifax, Huddersfield, and Wake-

field lie on the circumference of a circle which includes most of the woollen towns. Engineering works, especially the making of machinery for woollen mills, is important at Leeds, Bradford, and Keighley. The abundance of water-power and a local supply of good wool first led to the establishment of the woollen industry in this district. With the introduction of steam the manufacture soon outgrew the local supply, and now imports large quantities of wool, chiefly from Australia, through the neighbouring ports of Hull, Grimsby, and Goole, on the estuary of the Humber, and Liverpool, which is reached by railways and canals through the Aire Gap. Further south, in the basin of the Don, cutlery works are important at Sheffield, where the local rock makes excellent grindstones. Iron goods of every kind are made both there and at Rotherham. Locomotives are constructed at Doncaster. At the south end of this coal-field, lace and hosiery are made at Nottingham. Coal-mining is carried on throughout the district, the mines round Chesterfield being the most important.

The Southern Pennines are very picturesque. Where porous limestone occurs they have weathered into fantastic shapes, while caverns and underground rivers are common, especially along the Derwent. This stream rises in the so-called Peak District, which, however, is not characterized by sharp peaks, but by flat-topped hills. The Derwent and the Dove flow southward to the Trent.

On the western side of the Pennines, south of Morecambe Bay, the Lune and the Ribble enter the sea. They rise near the Eden, and flow first south and then west. The Mersey, further south, flows due east. The higher ground between the western courses of the Lune and Ribble is called Bowman Forest; that between the Ribble and the Mersey Rossendale Forest. Round the margins of Rossendale the coal crops out, and many mining towns and villages occur. Cotton manufacturing is the most important industry, in which Preston, Blackburn, Burnley, Rochdale, Bury and Bolton

are all engaged, forming a ring of cotton towns. Oldham, Manchester, and Stockport, which are also cotton towns, are built on the southern continuation of the coal-field, on the margin of the Pennines. The raw material is brought to the Mersey ports, especially Liverpool, and by the Ship Canal to Manchester, which is a great distributing centre rather than a manufacturing one. It comes chiefly from the United States, though Egyptian and Indian cotton are also used.



FIG. 39. The Towns within thirty-five miles of Manchester. Each black dot represents a town.

Preston, at the mouth of the Ribble, is also a port, but of much less importance. Engineering is important at Rochdale, Bury, and Manchester. Salt, found beneath the Cheshire plain, is conveyed to St. Helens, in the south-west of the coal-field, where important chemical works supply materials for bleaching and dyeing the cotton yarns and tissues. South of Stockport is Macclesfield, making silk goods. It lies midway between the Mersey and the upper sources of

the Trent, at the southern end of the Pennine coal-field. This district is called the North Staffordshire coal-field, or the Potteries, because earthenware is largely made there, especially at Stoke-on-Trent and Hanley.

It is only since the growth of the cotton industry that Liverpool on the east bank, with Birkenhead on the west bank of the Mersey estuary, has become the second port in the kingdom, and replaced Chester. The district is not particularly fertile, and the climate is very damp. This, though a disadvantage for the growth of cereals, is a positive advantage in the cotton manufacturing processes. Liverpool trades with all parts of the world, especially with the eastern ports of North and South America. The bed of the estuary has been dredged and deepened, and miles of docks have been built, which accommodate the largest ocean steamers. The double town of Manchester and Salford, on the Irwell, has already been mentioned as the great cotton mart. The cutting of the Ship Canal has greatly increased its importance and prosperity. Look at fig. 39, which shows that it lies in the centre of the greatest manufacturing district of Britain, an area within which there are more people than on any other area of the same size outside India or China. Notice in fig. 40 how large the black area is. The routes between Manchester and the Lancashire cotton towns are not all easy, for the Pennines have to be crossed to reach those on the east. These routes are of the utmost importance, for cotton manufacturers wish to send their goods to the North Sea and Baltic ports, which is most cheaply done from the Humber ports; and the woollen and iron towns of the east send their goods to the Mersey ports, to be consigned to many parts of the world. Of these routes that by the Aire Gap is the easiest, and it is used both by the canal and the railway which pass from Liverpool and Preston through Skipton to Leeds. Another route passes from Manchester through Rochdale to the valley of the Calder, a tributary of the Aire. A third runs from Manchester to Huddersfield, both canal and railway

having to pass under the mountains in long tunnels. Two other railway routes, both with long tunnels, connect Manchester and Sheffield. (See fig. 41.)

The Pennines affect the great through routes between



FIG. 40. Density of Population in Northern and Central England and in Wales.

England and Scotland. The West Coast route of the London and North-Western from Carlisle to the south crosses Shap summit, 1,000 feet above the sea, the lowest land between the Lake District and the Pennines, and runs south through

Lancaster, Preston and Wigan, to Crewe, in Cheshire, an important junction where the Welsh lines connect. The Midland route follows the well-marked Eden and Ribble valleys, but has to cross a higher pass. It then turns through the Aire Gap to Leeds and Nottingham. The East Coast Route of the Great Northern is near the coast from Berwick to Newcastle, whence it runs south by Durham and Darling-



FIG. 41. Towns and Routes of Central England.

ton, follows the Vale of York past York to Doncaster, and crosses the Trent at Newark.

The Welsh Highland and its Margin. The map in fig. 42 shows the districts of Wales over 600 feet above sea-level. This highland forms a continuous mass from north to south, surrounded by a narrow strip of lower land near the coast, which widens out in the island of Anglesey in the north-west

and in the peninsula of Pembroke in the south-west. The eastern limit may be taken as the main streams of the Dee and Severn.

The highland area is cut into by the valleys of rivers flowing north and north-west in the north, for example, the Conway and the Dee; flowing south-west in the west and south-west, for example, the Teifi and Towey; and south-east in the south-east, for example, the Severn, and its chief



FIG. 42. Lowlands and Highlands of Wales and the Welsh Border.

tributaries, the Teme, Wye and Usk. The upper part of the Severn flows from the mass of Plynlimmon towards the north-east. The south-westerly north-easterly direction of ridges and valleys is most marked in Wales, and agrees with that common in Scotland. The Carnarvon peninsula and the south coast of Cardigan Bay show it clearly. In the extreme south a west-to-easterly direction can be traced in St. Bride's Bay, Milford Haven, the Gower peninsula, and in the upper

Wye. The north-westerly south-easterly direction occurs in the south-east, where the streams turn to the Severn in the lowest part of the plain. The rocks here are softer, and the Plain of Hereford is shut off by lower heights from the Vales



FIG. 43. The Severn Basin.

of Gloucester and Worcester. Follow carefully the course of the Severn and its tributaries on the map in fig. 43. Wales is thus divided into a number of masses: that of Snowdon, in the north, is the highest south of the Grampians, and is a picturesque district with ridges and deep valleys, corries,

cirques, and mountain tarns. The Berwyn Mountains lie between the Dee and the Severn. The mass which runs south from Plynlymmon separates the eastern and western rivers, and the Brecknock Mountains lie south of the upper Wye and give rise to a series of south-west and south-east valleys in the south, of which the valley of the Taff is the most considerable.

Fishing and summer visitors make the prosperity of numerous small towns and villages round the coast, such as Aberystwyth and Barmouth, on the west, and Llandudno and Rhyl on the north coast. Slates are quarried in the old rock, and exported from Carnarvon and Bangor, at either end of the Menai Strait. Across this strait a great tubular bridge carries the line from Holyhead, on Holy Island, west of Anglesey, to Bangor, whence it passes along the coast to Conway, Rhyl, Chester and Crewe. In the south New Milford and Fishguard are ports in steamer connexion with Waterford and Rosslare, in Ireland. The main line of railway takes advantage of the west-to-easterly valleys to run by Carmarthen, Swansea, Cardiff and Newport, and through the Severn Tunnel below the Severn, to Bristol, or by Chepstow to Gloucester.

Turn to fig. 22 and notice the coal-fields in the east and south of Wales. The northern strip, from Flint to Oswestry, supplies fuel to small salt and woollen towns. In the centre a small field supplies the carpet manufactories of Kidderminster, and the potteries of Worcester. The Forest of Dean, east of the lower Wye, smelts iron with local coal. The South Wales coal-field is far the most important, and supplies coal for smelting iron, copper, and other ores to Swansea and Merthyr Tydvil. Coal in large quantities is carried by the lines which follow each valley to Cardiff, Swansea, Barry and Newport, for export. Engineering works and ship-building are important. These industries have transformed South Wales into one of the busiest regions in the Kingdom. The distribution of population is very remarkable. See fig. 44. The valley bottoms are either cultivated or covered with factories

and mining villages; the hills above, high, rounded and elongated, and sparsely covered with grass, have hardly an inhabitant. Pembroke, on the fine fiord of Milford Haven, is a government dockyard.

The hilly part of Wales is mainly a sheep-farming district, the flocks being sent to the lower warmer lands round the coast, especially of Cardigan Bay and of Anglesey, in winter. Small woollen manufacturing centres have sprung up, such as Welshpool and Montgomery on the Severn, and small market



FIG. 44. Density of Population of S. Wales and SW. England.

towns are built in the valleys, usually where two or more routes converge, as at Bala, or Brecon. A number of summer resorts and watering-places have arisen, especially where mineral springs occur, as at Llandrindod, near Builth.

The Plain of Hereford is a specially favoured region, protected by hills, which give it the dry and comparatively warm and sunny summer climate which has made its apple-orchards and hop-gardens famous.

The districts where Welsh is spoken are shown on fig. 23.

English influence has spread along the low-lying plains, e. g. Hereford, the valleys, e. g. the Severn, and even in Pembroke, which has been called 'a little England within Wales.' Chester on the Dee, in the north, Shrewsbury in the centre, and Gloucester in the south, both on the Severn, guard the north, central and southern routes from England into Wales. Numerous castles in the eastern valleys and along the north and south coast routes strengthened the power of the English conquerors along the Welsh Marches, or Border, e. g. Ludlow, Monmouth, and round these towns naturally grew up.



FIG. 45. Routes and Towns of SW. England.

South-west England. South of the Bristol Channel are three masses of higher land, Exmoor, Dartmoor, and Bodmin Moor, forming the nucleus of the south-west peninsula, Exmoor is cut off from the east by the plain of Somerset. The Exe and Tamar flow south almost across the peninsula, each opening to form an estuary. The north-flowing Tor forms a valley between Exmoor and Dartmoor. These moors are undulating uplands of heather moor and peat moss, with hardly an inhabitant. The valleys round are fertile and well-peopled. Exeter has been built at the head of the Exe estuary, and Plymouth at the mouth of the Tamar estuary,

which is known as Plymouth Sound. This inland stretch of easily-protected water forms an important naval station. Plymouth, in the narrower sense, is one of 'the three towns,' Plymouth, Devonport, and Stonehouse, of which Devonport is the naval station. Lying near the extreme west of the English Channel, Plymouth is a port of call for many ocean steamers to land mails and passengers. (See fig. 45.)

Inlets similar to Plymouth Sound, or rias, as they are called, are found at the mouth of the Dart, where Dartmouth is built, and in Falmouth Sound, another naval station. The south coast is much indented by bays, on which are built fishing-towns and seaside resorts, such as Penzance and Brixham. The mild climate makes this coast a favourite invalid resort, and Torquay, on Tor Bay, is a popular winter resort. The peninsula ends in two smaller peninsulas, that of Land's End in the west, and the Lizard in the south. St. Ives lies north of Land's End, Bideford and Barnstaple are at the head of the estuaries of the Torridge and Taw, which open to the wide Barnstaple or Bideford Bay. Ilfracombe and Lynton are watering-places on the north coast of Exmoor. A number of small towns are found inland, Taunton, in the Vale of Somerset, or Vale of Taunton, being the chief.

Fishing is very important all round these coasts, Brixham, St. Ives, and Penzance being the chief centres. Tin and copper mining are much less important than formerly.

Off Land's End lie the Scilly Isles, with an even milder climate than Cornwall. Market gardening is largely carried on, especially to supply early flowers and vegetables for London and the country markets.

The Midlands and South-east England. Look at the map in fig. 46. North of the Thames are three great lowlands and two belts of hills running from south-west to north-east. The lowland in the north-west forms the Midlands of England, drained to the south-west by the Severn and its tributary the Avon, and to the north-east by the Trent and its tributary the Soar. In the slightly higher ground in the centre is

a coal-field, at the edge of which is Birmingham, the largest city of the Midlands, a great iron centre. A number of towns to the north-west are all engaged in the same industry, the most important being Wolverhampton, Wednesbury, Walsall, and Dudley. These form an almost continuous industrial



Fig. 46. The Scarp Lands of E. and SE. England. The Scarp ridges follow the lines of resistant rocks.

area, the air of which is thick with the smoke of innumerable chimneys and furnaces, well named the Black Country. The Vale of the Severn to the west is a wide band of agricultural land, with numerous small market towns, many of them, such as Worcester, Tewkesbury, Gloucester, being very ancient.

Salt is found at Droitwich, and furnishes the materials for glazing the fine porcelain which is made at Worcester. Kidderminster manufactures carpets. Evesham, on the Avon, has fine orchards and market gardens. To the south, where the plain narrows between the Malvern Hills and the Cotswolds, is Malvern, with medicinal springs. In the heart of the Midlands, Warwick, an old Roman city, with one of the finest castles in the kingdom; Coventry, a centre of the cycle trade; Rugby, with electrical works; and Leamington, with medicinal springs, may be noted. Leicester in the Soar basin, the most easterly town of the Midlands, manufactures boots and shoes. The Midlands open to the north-west through the plain of Cheshire, and to the north-east by the Vale of Nottingham already described.

The first belt of hills forms the limestone scarps, or ridges, of the Cotswolds and the Northampton Heights. These are drained to the south-east into the rivers of the central band of lowlands. Of these rivers the Bristol Avon flows round the southern end of the Cotswolds to the Severn, the upper Thames flows east across the next line of heights (see fig. 47), and the Nen and Great Ouse flow north-east to the Wash, across the marshy Fen land. These limestone heights are mainly sheep farms, though the lower slopes are cultivated.

In the central lowland belt the land near the rivers, which is often flooded, is in grass, but that above the flood limit is cultivated, the eastern part forming some of the richest agricultural land in the kingdom. The towns are agricultural and market centres, and a few manufactures are carried on on a small scale. Cloth is made at Stroud in the Cotswolds, blankets at Witney, gloves at Woodstock and the neighbouring villages, carpets at Abingdon, lace and chairs in Buckinghamshire. On the Bristol Avon Bath is built in the gorge cut by the river through the Cotswolds. Bristol, at the head of the tidal waters, has been an important port for centuries, and before the Reformation was the centre of a vast trade in stockfish. In the centre of the central lowland Oxford

is built at the junction of the upper Thames and the Cherwell, a point at which routes from all directions unite. It is the seat of the most famous English university, and is an ancient and picturesque town, with many fine college buildings and gardens. Round the margin of the Fens are the cathedral towns of Peterborough on the Nen, Bedford on the Ouse, and Cambridge, the second university, a town of the same picturesque character as Oxford. These are important centres



FIG. 47. The Thames Basin.

for the surrounding agricultural country. Ely, with a fine cathedral, is built on a slight rise in the midst of the Fens. Boston, at the mouth of the Witham, and King's Lynn, at the mouth of the Ouse, are old ports of the Wash, now of little importance.

The second belt of heights forms the Chalk Escarpment, composed of the White Horse or Marlborough Downs, the Chiltern Hills, and the east Anglian or Norfolk Heights.

These also have their steep slopes and short rivers to the north-west, and their long slopes and rivers to the south-east or east. The Chalk Downs, as they may be called, are a famous sheep country. They are bordered by the third belt of lowlands, the Vale of the lower Thames, and the East Anglian plain. This is excellent farming country. In the east it is penetrated by numerous inlets, of which the Thames estuary is by far the most important, that of the Stour coming next. In the north the coast is bordered by cliffs which are rapidly being eaten away by the sea.

Reading, where the Thames passes between the Marlborough and Chiltern Heights and the Kennet comes in from the west, is a busy town with growing industries, of which biscuits and seeds are the best-known (see fig. 47). Lower down is Windsor, with a magnificent royal castle on the eminence above the river. London, the capital of England and of the British Empire, is built not far below the head of the tidal water. A number of small and generally ancient towns lie in the gaps of the hills to the north, such as St. Albans and Hertford. In East Anglia, Norwich, on the Wensum, is the most important place, long famous for its woollen manufacture, which is now superseded by such industries as the making of agricultural machinery, the preparation of locally-grown mustard, the manufacture of starch, &c. Ipswich, on the Orwell, making agricultural machinery and railway plant, and Colchester, on the Colne, with famous oyster fisheries, are at the head of the estuaries of these rivers. All the villages and towns of the coast are growing summer resorts. Yarmouth and Lowestoft are important fishing and fish-curing centres. Harwich, on the Stour inlet, is one of the chief packet or passenger traffic stations, with daily sailings for the nearer continental ports.

London. Look at the map and observe carefully the position of London, which lies midway between the Chiltern Hills and the North Sea, almost at the head of the tidal waters, and at the last point where the river could be bridged. From the

most ancient days routes from all directions met here, making either for the bridge at London or for the ford at Westminster a little higher up the river. Round these two all-important means of communication grew up two cities, each with its



FIG. 48. Distribution of Population in SE, England.

great church—London, with the cathedral of St. Paul's round London Bridge, and Westminster, with its abbey, round the ford farther west. Both of these cities still exist within the modern county of London. The second cause of the greatness

of London was its fine estuary, opening to the east, and the position of the city where the tides would float shipping up and down the river twice a day. Ease of communication by sea and land, and the command of the river at its most important point, have made London what it is to-day—the largest and richest city in the world, covering over 100 square miles, and containing a population of nearly 7,000,000 people (see fig. 48). Its main line of growth has been round both banks of the estuary for the commercial and working-class districts, and up the surrounding heights for the residences of the middle and professional classes, many of whom live several

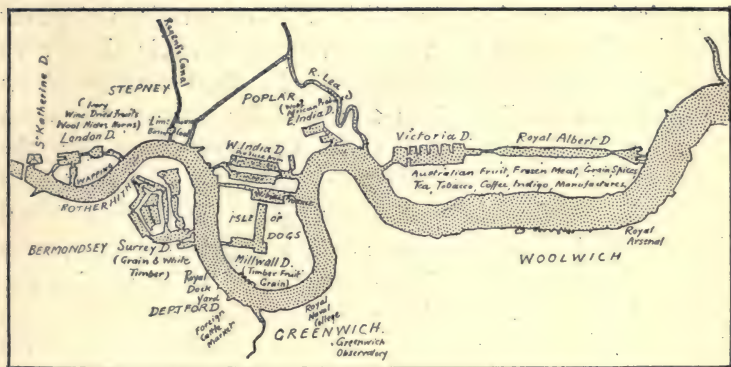


FIG. 49. London Docks and the Commodities brought to them.

miles from their place of business. Docks and wharves line the shores of the river, receiving the ships and storing the wares of all parts of the world. The principal docks, with the chief commodities discharged at each, are shown in fig. 49.

The chief historical buildings of London are the Tower, built to command the bridge and to overawe the not always loyal City of London, the cathedral of St. Paul's, replacing an earlier one which perished in the Great Fire of 1666, and the abbey of Westminster. The City of London, with its banks, exchanges, and offices, is the business centre of the British Empire, and the much larger City of Westminster, with its

Houses of Parliament and government offices, is the political centre. There are numerous museums, picture galleries, and other public buildings. London is a badly-planned city, with narrow streets and miles of mean houses, except in the fashionable or West End quarter, where there are handsome streets surrounding the large royal parks. The centre of London is being gradually rebuilt, and in the course of a few years it will have become a handsomer and more convenient city than it is at present.

Railways. Nearly a dozen great lines of railway, and others of less importance, converge upon London (see fig. 50). Those from the north cross the limestone and chalk escarpments in the natural gaps, and follow the river valleys wherever possible. The three great through routes from Scotland have already been traced to the southern end of the Pennines. From Crewe, where the lines from North Wales connect, the West Coast or North-western route runs south-east, passing the limestone heights in a tunnel near Rugby and the chalk heights in the dry Berkhamstead Gap. The Midland and Great Central routes follow the Soar valley to Leicester, from whence the Great Central runs south to Rugby, passing the chalk heights by the Wendover Gap and also by the Wycombe Gap farther to the south-west, while the Midland crosses the limestone near Market Harborough, passes Bedford, enters the chalk near Luton in a gap drained by the river Lea, and reaches London through St. Albans. The East Coast or Great Northern route runs farther east, where the heights are insignificant, passes the margin of the Fens at Peterborough, and runs due south to London through Huntingdon and Hatfield. Farther east the Great Eastern brings the Fens and East Anglia into communication with the capital, the main lines passing from King's Lynn by Ely and Cambridge, and from Norwich and Yarmouth through Ipswich, Colchester, and Chelmsford.

The most important line entering London is the Great Western, which brings the whole district between North Wales

and South Devon and Cornwall into communication with the capital, connecting it with the great ports and 'naval stations on the west and south coast, as well as with the busy industrial districts of the Midlands. Its mileage is the greatest of any



FIG. 50. The Towns and Routes of SE. England.

line in the kingdom, and its main lines are numerous. From Birkenhead, on the Mersey, opposite Liverpool, one runs by Chester, Shrewsbury, and Birmingham, across the Midlands, and by the Cherwell valley, at the east end of the Cotswolds,

to Oxford, where it joins the line from Worcester, which has crossed the Cotswolds by the Evenlode valley. At Didcot the line from Oxford joins the great West of England lines, those from South Wales coming by Swansea, Cardiff, and Newport, either to Gloucester, and thence by the Stroud valley to Swindon, or by the Severn Tunnel and tunnels



FIG. 51. Navigable Waterways of England and Wales.

through the Cotswolds to the same place. There they are joined by the lines from Bristol, where the Devon and Cornwall lines connect, and Bath, through the Avon Gap. From Didcot the line runs due east to London through Reading, where a shorter line from the south-west of England, utilizing the Vales of Pusey and the Kennet, comes in. The line

passes between the Marlborough and Chiltern heights by the Reading Gap and runs due east to London.

The lines connecting London with the districts south of the Thames will be mentioned later.

London is also a centre of inland waterways, but not to the same extent. (See fig. 51, and compare with fig. 50.)

Southern England. The heights south of the Thames diverge from Salisbury Plain, or Plateau. The Mendip Hills in the north-west and the Western Downs in the south-west are separated by the Plain of Somerset. The North and South Downs are two lines of chalk heights running east (see fig. 47). In the centre of the land between them rise the wooded heights of the Weald, separating the Vale of Kent in the North from the Vale of Sussex in the South. South of the Western and South Downs are the Vale of Dorset and the Hampshire Plain, much intersected by the sea, and rising in the south-west to the Downs of Purbeck and the Isle of Wight, separated from the mainland by the Solent and Spithead. The hills, which are mainly composed of chalk, are famous sheep pastures, while the vales and plains are richly cultivated.

The plain of Somerset is drained by the Parret to the Bristol Channel. Round Taunton, in the district known as the Vale of Taunton, very fine wheat is produced, and a large area is covered with orchards.

The Vale of Kent, of which Tunbridge is the centre, with its rich orchards and hop-fields, well deserves its name of the Garden of England. Its prosperity is shown by the large number of towns and villages, which may be looked out in a large map. Important towns are situated in the gaps of the North Downs, including Guildford on the Wey, Maidstone on the Medway, south of the Downs, and Rochester and Chatham at its mouth, north of the Downs. Along the lower Medway cement works use the local chalk as their raw material. Queenborough, on the island of Sheppey at the mouth of the Medway, is a packet station. Canterbury, on the Stour, to the north of the Stour Gap through the North

Downs, is the ecclesiastical capital of Southern England, and the seat of an archbishop. The coast of the Thames estuary and Kent is dotted with fishing and seaside towns, all of which, and particularly Margate and Ramsgate, are crowded with visitors in summer. Dover and Folkestone, at the end of the North Downs, are packet stations. Romney Marsh, at the eastern end of the Vale of Kent, is famous for sheep.

The Vale of Sussex resembles the Vale of Kent, but has fewer orchards and hop-gardens. The chief town is Lewes, at the north end of the Ouse Gap through the South Downs. Newhaven, at the mouth of the same river, is a packet station. Hastings, at the eastern end of the Weald, Eastbourne and Brighton, separated by the fine chalk headland of Beachy Head, are fashionable seaside towns.

In the Hampshire Plain Portsmouth, with a well-protected harbour entered from the Spithead, is the chief naval station in Britain. Southampton, on Southampton Water, at the mouth of the Itchen, the chief port on the south coast, has four tides daily, two coming up the Solent, and two up the Spithead. Winchester, placed where the Itchen breaks through the South Downs, is one of the most ancient cities in England, and was formerly the capital. Further west, Salisbury, with a fine cathedral, is similarly built on the Wiltshire Avon, where it leaves the chalk heights. On Salisbury Plain is the celebrated stone circle of Stonehenge, of unknown antiquity, and probably built by a long-forgotten race of sun-worshippers. On the coast, a little to the east of the mouth of the Avon, is Bournemouth, a fashionable health-resort, sheltered by pine woods. Dorchester is built at the western end of the Vale of Dorset, and south of the Purbeck Downs is Weymouth, a packet station for the Channel Islands.

The Isle of Wight is a fertile island, about 150 square miles in area. The north is wooded; the south consists of chalk downs and fertile sandy soils. The climate is mild, and all round the coast are fashionable towns, of which Cowes is a great yachting centre. The capital, Newport, is an inland town.

The districts south of the Thames are connected with London by several lines, all of which have to cross the chalk heights, either by natural gaps or in long tunnels, before they reach the sea.

The South-Western runs west roughly parallel to the North Downs, and climbs to the chalk heights at Basingstoke, passing through Salisbury and Yeovil to Exeter and the south-west. From Basingstoke a line goes through Winchester to Southampton, the New Forest, and the South Coast towns. (See figs. 45 and 50.)

The lines to the coast towns between Portsmouth and Hastings use either the Wey Gap at Guildford, the Mole Gap at Dorking, the dry gap at Redhill, or the Darent Gap, near Sevenoaks, to cross the North Downs, and the Arun, Adur, and Ouse Gaps to cross the South Downs, while the main line to Brighton passes under the South Downs in a long tunnel. Folkestone and Dover are joined to Sevenoaks by a line following the Vale of Kent to Tonbridge, and by one along the margin of the North Downs by Canterbury and Rochester. (See fig. 50.)

Islands. Man (230 sq. miles), in the Irish Sea, almost equidistant from England, Scotland and Ireland, is a mountainous island, rich in minerals, especially lead. It possesses its own Parliament, the House of Keys, which sits in Douglas, on the east coast, the largest town. The picturesqueness of the island attracts thousands of tourists.

The Channel Islands, in the English Channel, 80 miles from England and 10 from France, are the remnants of England's French possessions, and still use a dialect of French. The islands have self-government. Orchards are numerous, and fruit and early vegetables, especially potatoes, are grown for the English market. Cattle are bred in large numbers. The largest islands are Jersey (45 sq. miles), capital St. Helier, Guernsey (25 sq. miles), capital St. Peter's Port, and Alderney (4 sq. miles).

EUROPE

Position. The most northerly point, North Cape, is distant nearly 20° from the pole; the southerly point, Cape Tarifa, is over 35° from the equator. From north to south, therefore,



FIG. 52. Europe—its Peninsulas, Islands, and Seas.

Europe covers little more than one-third of the distance between pole and equator, and lies almost wholly in temperate latitudes. The most westerly extension of the mainland reaches nearly to 10° W., while the eastern boundary roughly coincides with 60° E.

Seas, Gulfs, Peninsulas, and Islands. Look at fig. 52.

Notice how the mainland is cut up into peninsulas by the sea, which penetrates deeply into the northern half of the continent as the North Sea, and the Baltic Sea, with its gulfs. These we may call the Northland Seas. Still more deeply cut is the Mediterranean Sea in the south, connected through the Strait of Gibraltar with the Atlantic Ocean. It



FIG. 53. Map showing Distances from the Coast. N.B. The distances from the Caspian are also shown. The smaller circles have their centres at London, Vienna, Madrid, and Rome; the larger circles have their centres at Stockholm, Moscow, Constantinople, and Tiflis.

widens out into northward-running gulfs, which cut the southern half of Europe into three great peninsulas. Connected with the Mediterranean on the east by the Dardanelles is the small Sea of Marmora, leading by the Bosphorus into the vast Black Sea, which opens by the Strait of Kertch into the small Sea of Azov. All these may be regarded as

together forming a Midland Sea. The land-locked Caspian Sea, still farther east, is not connected with the Midland Sea.



FIG. 54. Physical Features of Europe.

The result of this penetration of land by sea is to bring all parts of Europe within a short distance of the sea (see fig. 53), and to give Europe, and particularly the penin-

sular countries, a very great extent of coastline, and many excellent harbours. The inhabitants readily become skilful fishers, sailors, and traders by sea. They are, in consequence, keen explorers, and good colonists, and they, and their descendants in other continents, lead the world in all seafaring occupations.



FIG. 55. Key to Physical Features of Europe.

Relief. Look at the relief map, fig. 54, which shows five different levels of land :

1. The shallow seas under 600 feet deep, covering the continental shelf ;
2. The lowlands, between sea-level and 600 feet elevation ;
3. The uplands between 600 and 1,500 feet ;
4. The highlands between 1,500 and 3,000 ;
5. The mountainous lands over 3,000 feet.

Observe that the deep seas form three basins :

1. The Arctic Ocean with its southern gulf, the Norwegian Sea, separated by a submarine ridge stretching from the British Isles through the Faeroe Islands and Iceland to Greenland, from

2. The main basin of the Atlantic ;

3. The basins of the Mediterranean, divided from each other by submarine ridges.

Notice that the inner seas of Europe fall into two groups—the shallow Northland and the deep Midland Seas. The shallow seas make exceptionally rich fishing grounds, visited by fishing fleets from the numerous excellent harbours of the surrounding shores. The tides of the Atlantic are strongly felt in the shallow seas of the west, causing a great rise and fall in the estuaries which open to them, and carrying the shipping up and down with the tide. The Baltic is almost landlocked, and the tides are scarcely felt. The rivers consequently form deltas instead of estuaries, and numerous lagoons border the sea. The deep Midland Seas are also tideless. Deltas and lagoons are formed as in the Baltic. The seas are less rich in fish than the shallow seas.

The shallow seas border the lowlands, of which they are the submerged portions. Lowlands and shallow seas together form a continuous band stretching across Europe from east to west ; broad, but for the most part submerged, in Western Europe ; narrowed to a little more than a quarter of the breadth in Central Europe ; and widening out in the east to form the compact mass of Eastern Europe, stretching from the White Sea in the north, to the Black and Caspian Seas in the south.

The lowlands may be grouped as :

1. The Plain of the Low countries.

2. The German Lowland.

3. The Plain of Russia.

The lowlands are bordered by the uplands, highlands and mountains of Europe.

Look at the map, which shows that these form three groups (compare fig. 55 with fig. 54):

1. The Ural Mountains on the east.
2. The Highlands of Britain and Scandinavia, or the North-west Highlands, on the north-west.
3. The Central and Southern Mountains and Highlands which form the bulk of Central Europe and of the Mediterranean peninsulas and islands on the south. These may be grouped into :

(a) The Central Highlands.

(b) The Alps and Karpathians, each curving round to enclose a lowland, the former that of Lombardy, the latter that of Hungary.

(c) The mountains of the southern peninsulas and islands.

The Plain of the Low Countries consists of deltas and marshes. It lies so low that it is continually in danger of flood from sea and river, to prevent which dykes have been built to keep out the sea, and to confine the streams of the deltas to their channels. Where the coast is sandy the sand hills, or dunes, are planted with coarse grasses, whose long creeping roots mat the light sands together, and enable them to resist wind and water.

The North German Lowland consists of two belts, a low hilly land bordering the sea, known as the Baltic Heights, and a plain to the south. This hilly land, which is separated from the sea by a narrow belt of low sandy shore and lagoons, consists of low wooded hills, interspersed with thousands of lakes. It slopes gently southward to the flat plain of central Germany. In the plain the landscape consists of healthy moors and pine forests, varied by rich green meadows and cultivated fields. The rivers creep sluggishly across the plain, often flooding the low surrounding country, and on approaching the sea form deltas.

The Russian Plain lies mainly between 300–600 feet above sea-level, rising gradually from west to east. It rarely exceeds

1,000 feet in elevation. The differences which it shows in different parts are due to the influence of climate and soil on its vegetation, the forest giving place in the south to rolling grass and wheat lands. As this plain contains nearly half the area of Europe the rivers which crawl across it are the longest in the continent.

The Russian plain rises in the east to the wooded Ural Mountains, which form the eastern limit of Europe.

The Plateau of the North-west Highlands forms the bulk of the Scandinavian peninsula, and is continued in the highlands of Britain. In Scotland it rises, as we have seen, to the height of over 4,000 feet, and it reaches twice this elevation in Scandinavia. In Scandinavia the plateau rises steeply from the sea on the west, and descends first abruptly and then gradually to the sea on the east, so that Norway in the west is almost wholly a mountainous country, while Sweden in the east is undulating. The west coast is a fiord coast, like the west coast of Scotland, but in Scandinavia the fiords penetrate far more deeply into the land, and their mountain walls are far higher and more precipitous. The lower parts of the plateau are covered with pine forests, but the high plateau, or fjeld, consists of heaths and bogs, with mountains of uniform height occasionally rising above the general level.

The Central Highlands consist of a number of separate masses of hills, rising to from 3,000 to 5,000 feet above the sea, usually with rounded summits, and densely wooded almost from top to bottom. The lower slopes are cleared for cultivation, or for pasture lands. The intervening plains are richly cultivated.

The Alps are from two to three times as high as the Central Highlands. They consist of parallel ranges, separated by deep steep-sided valleys, some of which contain long narrow lakes where they open to the plain. Many of the peaks rise above the line of perpetual snow, which accumulates to so great a depth in the valleys between that it is

changed into solid ice by its own pressure. These accumulations of ice creep in long tongues, or glaciers, down the valleys, melting at last into rushing torrents. Below the snow line, but still too high for trees, are the alps, or mountain pastures. Lower still the sides of the valleys are clothed with forests, first of dark evergreens, and lower of deciduous trees. The valleys widen out, and at lower levels their floors and sides are cultivated.

In the eastern Alps are limestone ranges, too precipitous for snow to lie on, with bare rock peaks, which are often of fantastic shape.

A few great valleys lead far into the heart of the Alps. At certain points it is possible to pass from the head of one valley directly to the head of another, over a col or mountain pass, a sort of depression between the peaks which enclose the valleys. Without these valleys, and the passes to which they lead, the Alps would be impassable.

The Karpathians continue the curve of the Alps, but reach to little more than half the height of the highest Alpine peaks. They are rounded ridges except on the north, where rocky peaks rise to 8,700 feet. Except on the highest slopes, which are grass-covered, they are thickly forested.

The Iberian peninsula in the west, and the Balkan peninsula in the east, are both broad, with a high plateau in the centre. The central, or Italian peninsula, is long and narrow, with a backbone of mountains. Active volcanoes are found in the south-west. The highlands of these peninsulas are all forested in the north, but bare in the centre and south.

Rivers. The rivers of the North-west Highlands are short and unimportant on the steep north-western slope; longer, but still rapid, on the longer eastern slope, over which they flow to the Baltic.

The short slope of the Russian plain is also to the north-west, but as it is very gentle the rivers draining to the Baltic and White Seas, though long, are very sluggish. They are divided from the rivers flowing down the long slope to the

Black and Caspian Seas by a line of higher ground, which runs from the Karpathians north-east to the centre of the Urals. The Volga, the longest river in Europe, flowing to the Caspian, and the Dnieper, flowing to the Black Sea, are the most important. All the rivers are slow, and navigable almost to their source. They are frozen in winter, as are those flowing to the Baltic and White Seas.

The rivers flowing from the Central Highlands are swift in



FIG. 56. Chief Drainage Areas and Divides.

their upper courses, but become slow enough for navigation as they cross the plain. The Vistula, the Elbe, the Rhine, the Seine, and the Loire are the most important. The Rhine is exceptional as being the only river which crosses the entire breadth of the highlands of Central Europe, connecting them with the Alpine region in the heart of which it rises. Two rivers drain the outer, or convex margin of the Alps, the Saone-Rhone on the west, flowing to the Mediterranean, and the Danube on the north, flowing to the Black Sea. The

inner, or concave margin is drained by the Po, which has formed a low-lying plain between the Alps and the mountains of the Italian peninsula. Most of the rivers of the southern peninsulas have their courses mainly in the highlands, and are navigable only near their mouths, where they enter the lowlands.

The valleys of some of these rivers form important routes,

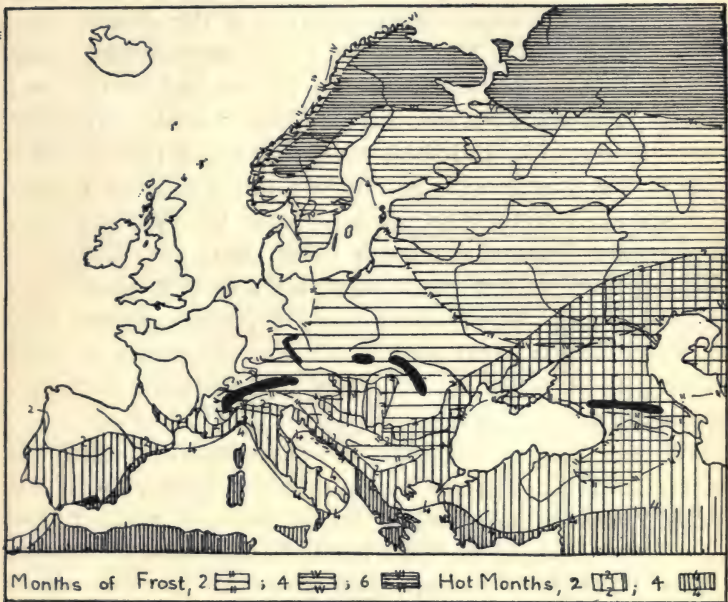


FIG. 57. Temperature Map of Europe, showing the Duration of Frosty and Hot Weather. The cross-rulings show the regions with greatest ranges of temperature.

followed from ancient times by roads, and at the present day by railways. The Seine, with the Saone-Rhone valley, and the Rhine with the tributaries of the Po, form through routes from north to south. The Danube is the great natural route from west to east, connecting Central Europe with the Balkan peninsula and the countries round the Black Sea.

The areas drained to the different seas are shown on fig. 56.

Climate. Look at the map in fig. 57. It shows the regions of Europe where frost occurs in winter. Notice that nearly all Scandinavia and Central Europe have more than two months' continuous frost in winter. The greater part of the Russian plain has over four months' frost. Notice too that all the western coasts and the Mediterranean have no long continued frosts, though occasional frosts occur. The period of frost in the Baltic is shorter than on the surrounding lands. All this is what we should expect from our study of the climate maps of the British Isles. The warmest winter regions of Europe, as in the British Isles, are those near the sea, and for the same reason. The sea is warmer than the land in winter, or, rather, it cools less quickly, and it warms the air which passes over it towards the land. The severity of the winter in Europe increases, not exactly from south to north, though the winters of Northern Europe are much colder than the winters of Southern Europe, but much more from west to east, where the land widens out and the interior is farthest distant from the sea. Over a great part of Europe the winter is much milder than it would have been if the continent had been more compact.

The same map shows where the summers are longest and hottest. In the Thames valley, the warmest part of the British Isles, the temperature in the heat of summer does not average over 64° F., and when for a few days it averages over 70° F. we feel the heat very oppressive. The map shows that the Midland Seas and their surrounding lands have an average temperature of over 70° F. every day for over two months of the year, while in the extreme south this average is maintained for four months. Notice particularly that in the south-east of Russia it becomes hotter in summer as we go in a north-easterly direction, that is to say, away from the sea. This, again, entirely agrees with our observations in the British Isles. The influence of the sea is to make the climate of the neighbouring lands uniform, or equable, by keeping down the heat in summer, and, in a still more marked degree, by

keeping down the cold in winter. The lands of the west, no part of which is very far from the sea, have no extremes of heat or cold, while in the Russian plain, farthest from the sea, places in the latitude of the English Channel have four months' steady frost, and over two months' intense heat. But for the cutting up of Europe by the Northland and Midland Seas a great part of the continent would have a much hotter

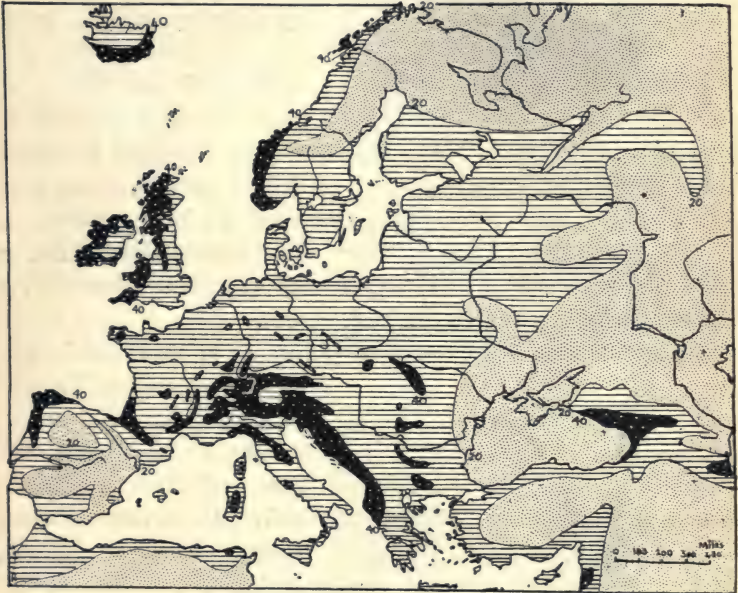


FIG. 58. Mean Annual Rainfall of Europe. The dotted parts have under 20 inches, the ruled parts from 20 to 40 inches, and the black parts over 40 inches of rain.

summer and a much colder winter, that is a much more extreme climate. That this is not the case is, perhaps, the greatest of all the advantages which result from the distribution of land and sea already described.

Climate, as we know, is affected, not by temperature only but by moisture. Look at fig. 58, where the map shows the rainfall in any year in different parts of Europe. If we

compare it with the relief map in fig. 54 it will be seen that the rainiest regions are highlands, and that the plains are, on the whole, much drier. This was also true for the British

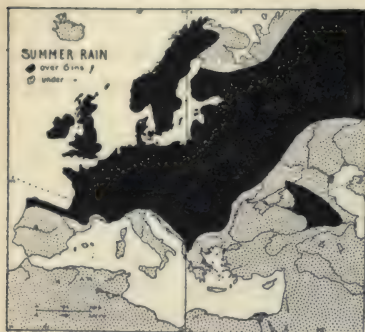


FIG. 59. Regions of Europe receiving more or less than 6 inches of rainfall during the summer three months.

Isles. Now compare the rainfall of east and west, either in the lowlands or in the Scandinavian or the Iberian peninsula. As in Britain there is a great contrast between the wet west and the dry east. To explain it we look at the wind arrows in fig. 18, which show that the prevailing winds are west or south-westerly. That is to say, they come over

the sea, bringing rain to the west coasts.

Fig. 58 shows only the total quantity of rain which falls



FIG. 60. Regions of Europe receiving more or less than 6 inches of rainfall during the winter three months.

in the year, but in different parts of Europe, owing to the great extent of the continent, rain falls at very different times. Look at fig. 59, which shows the rainfall in the summer three months, June, July, and August. The rainfall is fairly equal all over Northern Europe, but greatest in the highlands, and very small round the Mediterranean, where hardly

any rain falls. The air over the land becomes heated in summer and rises to the colder regions of the upper air,

where it is chilled and the moisture it contains condensed into rain. The prevailing winds are still from the Atlantic. Over the Mediterranean the wind is blowing from the north-east, i.e. from cooler to warmer regions, so that the air is not cooled, and there is little or no rainfall.

Now look at fig. 60, which shows the rainfall in the three winter months, December to February. Notice that all the east of Europe is very dry, and that it is only along the very margin of the western Mediterranean coasts and in the Alpine region that rain falls abundantly. The prevailing winds come from the south-west, that is, from warmer latitudes and over the sea, which we have already seen is warmer in winter than the land. On reaching the land, therefore, the air is cooled, and parts with its moisture as rain or snow, so that it is comparatively dry before it reaches the interior of Central and Eastern Europe.

We can now divide Europe into the following three climatic regions:—

1. The West, with equable temperature and rain at all seasons;
2. The East, with extremes of temperature and summer rains;
3. The Mediterranean, with hot dry summers and mild winters, and receiving the greater part of its rainfall during the winter six months.

Vegetation. Look at fig. 61, which shows the natural vegetation of Europe. It shows six different vegetation regions:

1. The tundra, or lands of the extreme north, which are too cold for the growth of trees, indicated by cross rulings.

2. The wooded or forest regions.

(a) The coniferous, or cone-bearing, needle-leaved, ever-green pine and fir woods of the north, represented by vertical ruling;

(b) The deciduous trees, which shed their leaves every

autumn, covering the lower part of Central Europe, represented by slanting ruling ;

(c) The evergreen forests of the Mediterranean basin, represented by horizontal rulings.

3. The steppe, or grass lands of the south-east, indicated by dots.

4. The mountain regions, too high for trees, shown in solid black.

The Tundra, in the extreme north, is perpetually frozen

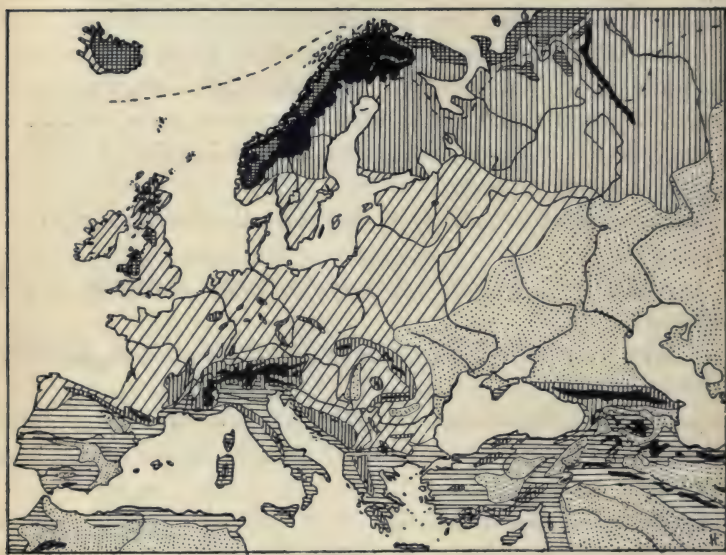


FIG. 61. Vegetation Map of Europe.

except for a month or two in the short summer, when it thaws to the depth of a foot or two. Water cannot penetrate this frozen soil, and the whole tundra tends to be marshy or water-logged in summer. Towards the pole vegetation disappears, but over the greater part there is a poor growth of moss, lichens, &c. Low berry-bearing bushes, such as crowberries and cranberries, appear further south, and dwarf trees,

a few inches or a foot or two in height, grow in sheltered spots, becoming larger and more numerous towards the forest edge.

The tundra offers nothing to its few inhabitants except the reindeer moss on which the reindeer feeds, and the berries which ripen in autumn. The reindeer alone makes human life possible. It provides a means of moving over the tundra, and supplies milk for food, and skins for clothing and other uses. The life led on the tundra is poverty-stricken even in summer, and in winter a move is made south to the forest edge.

The Coniferous Forests of the Scandinavian peninsula and the north of Eastern Europe consist of tall, straight firs and pines, beneath whose shade we find none of that undergrowth of flowers and grass which makes our own deciduous woods so lovely. Their tall straight stems make masts for ships, or are sawn into planks to build their keels and decks. The houses in the forest area are generally of wood, often beautifully carved and painted. Wood is used instead of coal for fuel, and is even burned in furnaces to smelt metals or, in some parts of the forest country, to drive the trains and steamboats. The trees are felled in winter and dragged over the frozen ground to the rivers, down which they float when the frost breaks up in the spring. On these forest rivers sawmills are often built where rapids or waterfalls make the current strong enough to turn water-wheels, and there much timber is sawn. In recent years the growth of trade has led to many new uses for wood. The best timber is made up into such articles as door-frames and window-sashes which are sent to other countries in a finished state. Wooden matches are made in large quantities, while timber of short length or inferior quality is made into pulp out of which paper is made.

Coniferous forests are also found on the highlands of Central Europe, where timber is put to much the same uses. On the Rhine, the Elbe, and particularly the Vistula, great rafts of

timber are floated down, steered by a small crew who live in wooden cabins built on the raft.

The Deciduous Forests of the Central European Lowlands are chiefly made up of oak, elm, beech, and further south chestnut. The girth of the trees is much greater, and their branching more irregular, so that they are unsuitable for masts. Their harder timber is used where durability is a consideration.

The Evergreen Forests of the south are unlike either of the preceding. Pines occur, but of a bushier shape, unlike the tall spires of the northern forests. The silver-grey olive groves, the forests of cork and other evergreen oaks, are the principal remains of the evergreen forests which once covered Southern Europe. These have been ruthlessly cleared throughout the Mediterranean lands to the great injury of the country. The roots of trees protect and bind together the soil and prevent rains and streams from carrying it away. Much of Southern Europe has been changed from a fertile, if rather dry, land to barren rocky hill-sides, in whose scanty soil only dry thorny plants manage to exist.

The Steppe, or treeless grass land, occupies the drier regions of the south of Eastern Europe, where the winter is severe, the summer hot, and the rainfall light. These conditions are not favourable for slow-growing plants, and as the soil is extremely light and loose trees do not root firmly. The plants which do best are those which come to perfection in a single year. As we see in our hay-meadows, grasses of various kinds grow very rapidly, and flower and seed in a few weeks. In the steppe grasses find exactly the conditions which suit them. The soil which has been frozen in winter thaws in spring, supplying moisture to their roots, while the sun grows stronger and hotter daily. In the spring the steppe is beautiful with expanses of many-coloured tulips, lilies, and other bulbous plants.

The steppe, in its natural condition, is fitted only for the rearing of grass-eating animals, particularly horses and sheep.

It offers no stone or timber for building or fuel, and the people of the steppe were, and in some cases still are, dwellers in tents, made either of the skins of animals or of their wool pressed into felt. Such trades as carpet-making, leather-working, and saddlery, utilize wool and skins in other ways. Towards the south-east, where the steppe is drier and hotter, the grass becomes poorer, and the country passes into a semi-desert condition.



FIG. 62. Northern limit of some cultivated Plants.

Such are the natural vegetation zones of Europe, but many changes have been made by man. Only the tundra now remains in its natural condition. The evergreen forests of the Mediterranean, and the deciduous forests of Central Europe, which covered the regions best suited for agriculture, have almost disappeared. Much more remains of the coniferous forest, for this is found either in colder parts of Europe or on the higher mountain slopes, neither of which are well suited for agriculture. Even the steppe has, within the last

century, been brought under the plough, and large tracts have been turned into agricultural land.

Look at the map of the cultivated plants in fig. 62. The most important are the cereals, wheat, barley, rye, and oats. Wheat, which, as we saw, needs warm and relatively dry summers, is grown throughout the Mediterranean lands and the deciduous belt, except where it is too high and cold or exceptionally wet or dry. It ripens excellently in the hot summers of the steppe, which is becoming a great wheat-growing land. Rye and oats are grown throughout Central and Eastern Europe on the poorer lands and in the higher districts. Barley is grown wherever agriculture is possible. Root crops are most important in the deciduous belt. The potato is universally grown, except in the coldest and driest parts of the continent. The turnip is also widely distributed. The sugar-beet is extensively cultivated in the central lowlands. The pulses, especially peas and beans, are largely grown in the Mediterranean and the deciduous belt. Lucerne is grown for fodder in the south, and clover further north. The fibre plants, flax and hemp, are chiefly cultivated in the lowlands of Central Europe and in the west of the Russian plain. (See figs. 69-71.)

Of fruits the grape vine and the olive, both Mediterranean plants, are the most important. Other Mediterranean fruits are the orange, lemon, fig, mulberry, pomegranate, and peach. The vine extends northwards, along the terraced southern slopes of the hills, far into Central Europe. As we go north the walnut, pear, plum, cherry, and particularly the apple, become more important. In the northern forest clearings fruits ripen only in good years, though the small fruits, strawberry, raspberry, &c., are still excellent.

Animals. As man has dealt with the vegetation of Europe, so has he with its animal world. The wild animals, like the forests, have disappeared before his advancing plough, though a remnant still survives in the remoter forests and on the higher mountain slopes. Some wild animals owe their

continued existence to his hunting tastes, to gratify which he affords them protection during their breeding season. Chamois in the higher mountains of Central Europe, wolves in the forests of Eastern Europe, the brown bear and lynx in the coniferous forests of the north, the wild boar in Central Europe, the fox and deer in this country, such small wild animals as the hare, rabbit, squirrel, &c., and some small fur-bearing animals in the northern coniferous forests, are

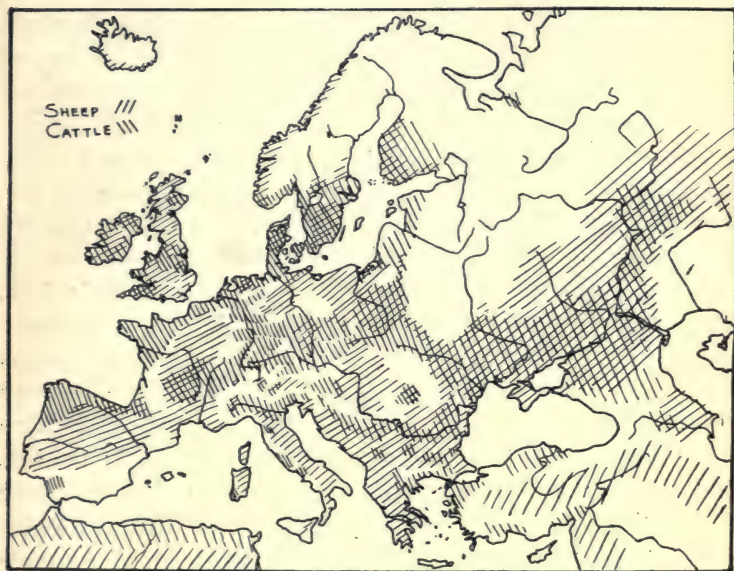


FIG. 63. Distribution of Sheep and Cattle.

almost all that now remain of the once numerous wild animals of Europe.

Man has introduced his own domesticated animals, as he has introduced his own cultivated plants.

The horse is found all over Europe, but in greatest numbers in the grass lands. It is less numerous in the mountain lands of the Mediterranean, where the mule becomes correspondingly more important. The donkey is important all over Central

and Southern Europe. Cattle are found throughout Europe, except in the north of the Scandinavian peninsula and of the Russian plain, but they are most numerous in the moister grass lands. Sheep become more important than cattle in the drier grass lands, on limestone pastures, on the steeper mountain slopes, and in the drier regions generally (see fig. 63). The goat replaces the sheep on still drier pastures, as, for instance, in much of the Iberian peninsula. The pig is an important domestic animal everywhere except in the northern forests. It is bred in immense numbers in the oak forests of Southern Europe. The reindeer is confined to the extreme north of Europe, where it lives on young sprouts and shoots in summer, and procures its winter food, the reindeer moss, by digging with its hoof in the snow. This hoof is broad and well suited for travelling over snow or over boggy yielding ground. The dog has followed man all over Europe. Another important group of domestic animals are the fowl, duck, goose, turkey, &c., which are bred both for their eggs and for their flesh. The common fowl is the most widely distributed, being found all over the continent except in the north of Eastern Europe. The others are most important in Central and Southern Europe, with the exception of the Iberian peninsula. Two other creatures of importance to man may be noted: the bee, which is found all over Central and Southern Europe, where honey is an important article of diet; and the silk-worm, which is reared in the Mediterranean lands where the mulberry on which it feeds can be grown.

Fisheries. Fishing is important in the shallow northern seas, where herring, cod, and flat fish are abundant. Off the fiord coast of the Scandinavian peninsula the summer fishing season is the busiest time of the year. Vast quantities of fish are salted, smoked, or dried in the sun, for export to the countries of Southern and Eastern Europe, where fasting is practised as a religious duty. The deep seas of the Mediterranean are less rich in fish, but the tunny and sardine fisheries are important. The chief river fisheries are salmon in the

rivers of Northern Europe, and sturgeon in the rivers flowing to the Caspian.

Minerals. The mineral wealth of Europe is varied and widely distributed. Gold is found in small quantities in the Urals and the Karpathians; silver, though very common, especially along with lead, is nowhere found in very large quantities. Copper occurs in many parts of Central and Western Europe, in the Urals, and especially in the south of the Iberian peninsula, where lead is also found, as well as in the British Isles. Mercury is mined in the south of the Iberian peninsula, and platinum in the Urals. Coal and iron, the most useful, are also the most abundant and are constantly found together. Iron occurs in varying quantities in most parts of Europe, though it is least abundant in the Italian and the south of the Balkan peninsulas, and in the north and south-east of the Russian plain. Coal is found on the northern margin of the Central Highlands, in Britain, in the heart and south of the Russian plain, and in the Urals. Sulphur is obtained in the volcanic regions. Petroleum is found on the outer margin of the Karpathians, and especially at the eastern end of the Caucasus, where towns have grown up which depend entirely for their prosperity on oil. Salt is mined in Central Europe, and in the British Isles, and evaporated from the sea round the coast, especially in the Mediterranean.

Building stone and clay are almost universally found, except in the steppe lands.

Distribution of Occupations. Look at fig. 61, which shows the distribution of vegetation. If this were the only circumstance to consider the occupations of Europe would be few and simple. Along the coasts we should have a fishing population, who would procure the timber for their boats from the nearest forests. In the tundra, where the reindeer is the only domesticated animal, and agriculture is impossible, we should have a very poor life, without settled home, as the reindeer must continually move on to find new feeding

grounds. In the forests we should have small scattered villages, and these would tend to be along the rivers, which take the place of roads in the forest. Hunting would be important, and such industries would be carried on as timber cutting, boat building, saw-milling, the extraction of turpentine in the coniferous forest, and the various other occupations suited to the forest, including the fur trade. On the steppe we should have great herds of cattle, horses, and other stock, with their owners dwelling in tents, following their flocks and herds hither and thither, and engaged in working up the hair, wool, skins, tallowfat, &c., yielded by their flocks.

Examples of these simple occupations are found all over Europe, but they are no longer the only ones. Agriculture has been practised for thousands of years, bringing with it the settled home, which has changed the shifting village into the town or city. The process of clearing the forest, and, recently, of ploughing the steppe, has transformed Europe into an agricultural country, in which mixed farming, which combines agriculture with the rearing of stock, is the most important occupation. According to special circumstances one or other of these branches becomes more important, as, for example, the cultivation of wheat in the rich soils of the Hungarian lowland, and the steppe; dairy-farming where rich moist pastures predominate, as in Ireland, or the Low Countries; or sheep-farming where there are large tracts of hill pasture, as in Wales, or the drier highlands of the Iberian peninsula.

As a country becomes agricultural, with a larger, richer population settled in cities and towns, new kinds of raw material are produced, new wants arise, and new occupations develop. Thus the clearing of the forest and the growth of settlement both makes houses necessary and provides the timber for them. The trades of the builder, joiner, carver, painter, develop, throwing off new branches as time goes on. The demand for better ploughs improves the smith's trade. The increase in the quantity of wool produced on sheep-

farms improves the weaver's trade, which in its turn requires machinery, and so on. Within the lifetime of the youngest a new trade, the making of motor cars, has come into being, and all the well paid trades connected with the use of electricity are quite young. All of these trades are carried on in all the principal towns of Europe, and many of the more important in the villages also.

Rather more than a hundred years ago it was discovered that steam could be used to drive machinery, giving a greater output at less cost. On the coal-fields, where cheap fuel could be had, it became more profitable to use land for manufacture than for agriculture. All over the coal-fields of Europe the population is largely engaged in smelting metals, making machinery, and carrying on weaving, or textile industries of many kinds.

Another group of occupations is connected with the selling of goods made by others, whether in small shops, or in large warehouses, which trade with all parts of the world, employing clerks, travellers, railway servants, seamen and others.

Still another group is concerned with the care of the sick, the education of the young, the teaching of religion, the practise and administration of law, and the defence and government of the country. These occupations are known as professions, and are carried on chiefly in the capitals, but in a greater or less degree in all the towns and villages of Europe.

Density of Population. The density of population depends on the occupation. Where that is destructive, as in the case of hunting, the supply of food gradually becomes exhausted and population never increases to any great extent. Where men are engaged in increasing the food supply, either by breeding animals or by cultivating plants, a much larger population can be supported on the same area. Animals rapidly eat a given area bare, and must move to another, and thus more ground is required for keeping animals than for growing crops. We have already seen that in the British

Isles the agricultural counties support a denser population than the pastoral ones. Population is densest in the manufacturing districts, which do not grow their own food, but import it from other parts of the world. (See fig. 64.)

Peoples, States, and Languages of Europe. An Italian, a Russian, or even a Swede, if we meet him in the street, at once strikes us as a foreigner. This is because the people of different parts of Europe differ considerably from each other



FIG. 64. Density of Population.

in height, build, colour, and shape of the head, though not so strikingly as Europeans differ from the inhabitants of Eastern Asia or of Central Africa. Except in the tundra, where man, like vegetation, does not attain full development, the peoples of Northern Europe are tall, slender, and fair-complexioned, with blue eyes and light hair. This type is commonest in the Scandinavian peninsula, and extends into our own country and across the Central Lowlands. It is

called the Northern race. In the mountain regions of Central Europe and in the centre of the Eastern Lowlands the people are shorter and stouter, with broader heads, and darker hair, eyes and skins. This is called the Alpine race. A third group, found in the Mediterranean lands, is slighter, but still shorter and darker than the preceding, and their heads are longer and narrower. This is the Mediterranean race. These



FIG. 65. Political Divisions of Europe.

racess extend across Europe from east to west, but they speak different languages, and belong politically to different states.

Look at fig. 65, observe the names of the states into which Europe is divided, and compare their position with the map in which the configuration is shown. The group of states lying round the Northland Seas are the British Isles, forming the United Kingdom of Great Britain and Ireland, or Britain; the Scandinavian peninsula, forming the kingdoms of

Norway and Sweden ; and the islands of the Sound, with the peninsula of Jutland, forming the kingdom of Denmark. On the southern shores are France, Holland and Belgium lying round the Rhine delta, and the German Empire, stretching across Central Europe, almost to the Alps.

Round the Mediterranean lie Spain and Portugal, occupying the Iberian peninsula, France, which has therefore a double advantage as regards sea, Italy in the Italian peninsula, with Switzerland crowning the Alps above, and Austria-Hungary possessing only a short coastline between the Italian and Baltic peninsulas. The Balkan peninsula is divided into several states—Roumania and Bulgaria, with a coast-line on the Black Sea, the land-locked Serbia, the little principality of Montenegro with a strip of coast on the Adriatic, Turkey, stretching across the peninsula from the Adriatic to the Black Sea, and Greece in the extreme south. The republic of Andorra in the Pyrenees, the principality of Monaco on the Mediterranean, surrounded by French territory, the republic of San Marino in Eastern Italy, and the principality of Liechtenstein, in the Upper Rhine valley, all very small, are of no political importance.

The whole of Eastern Europe is occupied by Russia.

A large number of languages are spoken, but those used by nine-tenths of the people of Europe belong either to the Teutonic language, spoken for the most part by the Northern race ; the Romance languages, spoken chiefly in the Western Mediterranean and derived from Latin ; and the Slavonic, spoken in Eastern and South-eastern Europe. Turkish, spoken in Turkey, Magyar, spoken in Hungary, with others less important, are of Asiatic origin.

NORWAY AND SWEDEN.

Look at the map of the Scandinavian peninsula, which consists of Norway (124,000 square miles) on the west, and Sweden (172,000 square miles) on the east (see fig. 66).



FIG. 66. Scandinavia and the Baltic Sea.

Notice that the west coast is protected for most of its length by a fringe of islands, called the skerry guard, or

skerry wall. This breaks the waves of the Atlantic, and makes calm channels between skerry wall and mainland. Notice also the long fiords penetrating scores of miles inland. Innumerable waterfalls descend from their mountain-walls, which in the Sogne and Hardanger Fiords rise to a height of 4,000 or 5,000 feet. Only here and there, as the map shows, is there flatter land along the coast. The whole of Norway is a mountain land, rising to a bleak interior of poor moorland, buried for many months under the snow.

Sweden consists of the longer, gentler slope of the Scandinavian Highlands, which descend by a well-marked step, or terrace, to a wooded granite plateau which stretches across Sweden, sinks beneath the Baltic, and is continued into Finland. Excluding the bleak highlands above, Sweden is a forest land, undulating rather than mountainous, and studded with innumerable lakes.

Climate and Products. The climate of both countries is severe. The winters are long and dark, especially in the north, where, in the depth of winter, there is but an hour or two of daylight. The short summer has equally long days. At midsummer, in the northern half of the peninsula, the sun never sets, and for some weeks night is reduced to an hour or two of twilight. Norway receives abundant rain, but Sweden is much drier. In this it resembles Great Britain, and for the same reason.

In Norway agriculture is almost impossible, but in Sweden, especially in the flatter south, it is largely carried on in the clearings. The prolonged summer daylight shortens the time between sowing and harvesting. The chief source of wealth, both in Norway and Sweden, is the forest, which supplies inexhaustible quantities of timber for export, either unworked in the shape of lumber, as it is called, or manufactured into joinery, wood pulp, matches, &c. The mountain streams supply the power necessary. To the forest produce is added that of the fisheries in Norway, and of the mines in Sweden. The combination of fiord, skerry wall and calm inner channels,

and the necessity of seeking food elsewhere than in the barren interior, has made the Norwegians a nation of seamen. Fishing-fleets sail all through the season to the whale and seal fisheries of the Arctic seas, the cod, herring and other fisheries of the Lofoden Islands, and to the fishing-grounds of the North Sea and the Atlantic.

The chief mineral wealth of Sweden is iron. The mines at Gellivara, in the extreme north, are so important that a railway has been built across the central highlands to the Ofoten Fiord, to reach a port free from ice all the year round. The iron mines of Dannemora, in the south, are also famous.

Towns. In both countries, and particularly in Norway, the towns are on or near the coast. Hammerfest and other northern towns are engaged in the whale and seal fishery. Trondhjem, on Trondhjem Fiord, is a famous old ecclesiastical city. Bergen, in the south, is a fishing and fish-curing centre. Kristiania, the capital, on the Kristiania Fiord, a magnificent mountain rift 100 miles in length, fringed with pines and walled with mountains, is built of stuccoed brick, with gaily painted wooden houses in the outskirts. Stockholm, the capital of Sweden, on Lake Mälär, is a city of islands, bridges, lakes, and pine woods. Upsala, the old capital, is a university town. Göteborg is a busy port, trading in lumber and forest produce. It is connected with the capital by the Göta canal, which crosses the forested lowland, and passes through several lakes, including Wener and Wetter, the largest in Sweden.

CENTRAL EUROPE.

Look at the map of Europe in fig. 65, and observe the political divisions. The kingdom of Denmark consists of the peninsula of Jutland on the mainland, with the adjacent islands, and the Faroe Islands and Iceland in the Atlantic Ocean. The kingdom of the Netherlands, or Holland, consists of the delta of the Rhine. Most of the remainder is occupied by the independent kingdoms, duchies, principalities, and

cities which make up the German Empire, or Germany. The diamond-shaped, mountain-bound kingdom of Bohemia is included in the Austrian Empire. The north is flat, and often marshy, especially round the Rhine delta. East of the Jutland peninsula the coast is bounded by the semicircle of the Baltic Heights, a forested, rather infertile, lakeland. To the south

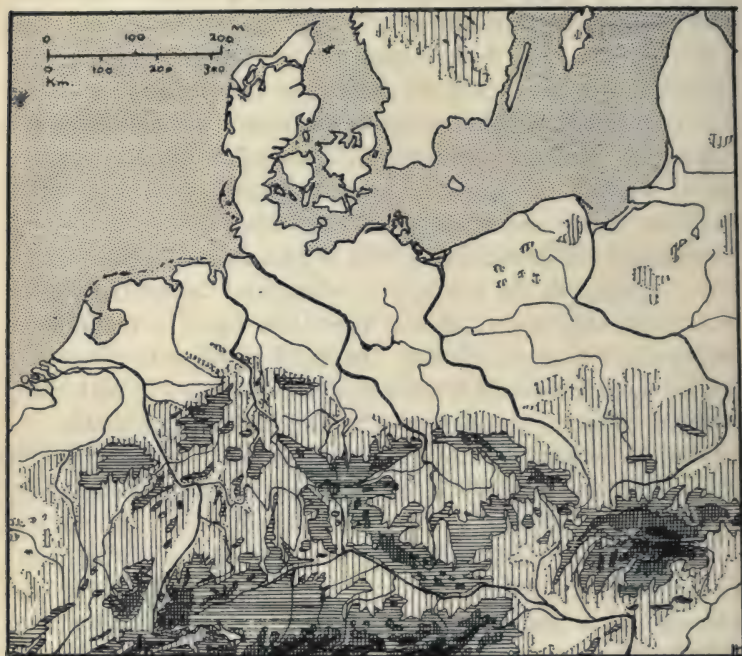


FIG. 67. Physical Features of Central Europe.

the country forms part of the great plain of Europe. This plain is crossed by numerous rivers, which rise either in the Central Highlands or in the Alps. (See figs. 67, 68.)

Climate and Products. The natural divisions of Central Europe run from east to west, and not from north to south. The north is on the whole flat, the south is on the whole high, and consequently there is less difference in the temperature of

north and south than would otherwise be the case. The climate is more equable in the west than in the east, for reasons already explained, and the east is drier than the west.

The soil is generally fertile, though in many parts of the east it is too sandy to suit all crops. About one half is cultivated, about a quarter is forest, and about one-fifth is pasture



FIG. 68. Names of Physical Features of Central Europe.

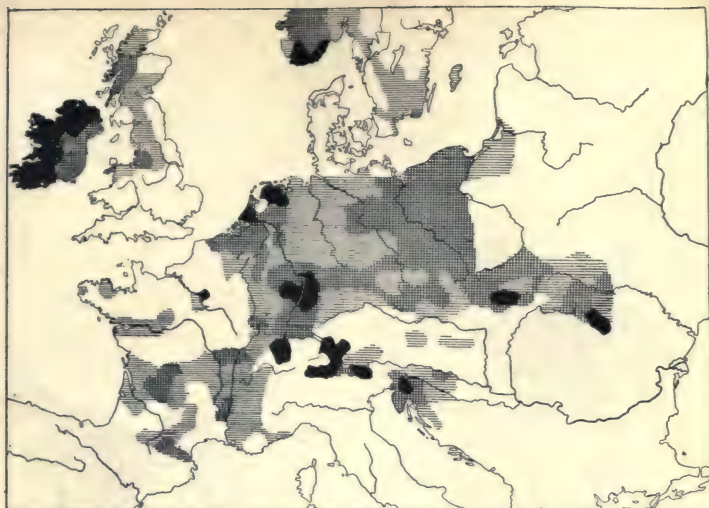
land. Pasture land is at least as important as agricultural land in Holland and Denmark. In Holland there is hardly any forest, and a greater proportion of waste land, chiefly marshes, than in the other countries of Central Europe. In the German Empire, which occupies the bulk of Central Europe, the richest agricultural land is in the west, where wheat is grown. On the poorer soils of the north and east rye and oats

are the chief grains cultivated (fig. 69), and large areas are planted with potatoes (fig. 70) and the sugar-beet (fig. 71), both of which give rise to important industries, spirits being extensively manufactured from potatoes, while sugar is made in enormous quantities from the sugar-beet. The manufacture of wine is



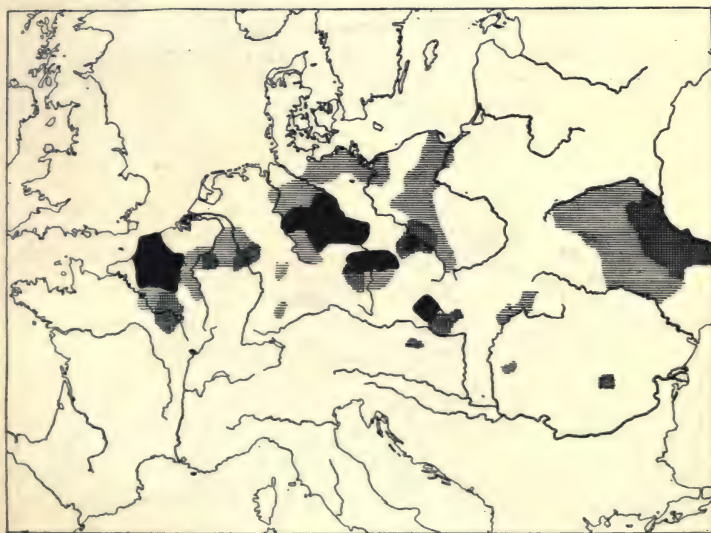
FIG. 69. Relative Importance of Wheat and Rye in Central Europe. The black parts indicate areas where more wheat is cultivated than rye, the shaded parts indicate areas where wheat is grown at least to half the extent of rye, and the white parts indicate areas where wheat is not grown to half the extent of rye.

important wherever the vine will ripen (fig. 72), and beer is made wherever hops can be grown or cheaply obtained (fig. 74). The numerous navigable waterways, rivers, and canals, with excellent ports at their mouths (fig. 76), allow raw materials to be cheaply carried to the coal-fields, on which the manufacturing



40% and more
 20% to 39%
 10% to 20%

FIG. 70. Map showing the Relative Importance of Potato Cultivation in Central and Western Europe.



10% and more
 5% to 9%
 2% to 4%

FIG. 71. Map showing the Relative Importance of Sugar-Beet Cultivation in Central Europe.



■ Vineyards

FIG. 72. Distribution of Vineyards in Central Europe.



● Coal Basins	○ Gold	⌋ Zinc	○ Saliferous Regions
▨ Lignite Basins	○ Silver	⌋ Lead	□ Salt
× Iron Ore	○ Quicksilver	⌋ Copper	⊗ Potassic Salt

FIG. 73. Distribution of Minerals in Central Europe.

towns are situated. These coal-fields are found on the northern margin of the Central Highlands where the Rhine, Elbe, and Oder and their tributaries leave them, and are known as the Westphalian, Saxon, and Silesian coal-fields. In the sheep-





 *Chief Brandy making Districts*
 *Hop Gardens*

FIG. 74. Distribution of Spirit (so-called Brandy) Manufactures (mainly from potatoes) and of Hop Gardens in Central Europe.

rearing districts wool is manufactured locally. Many parts of the highlands are rich in minerals and mining, and the various industries resulting from it, are important (see fig. 73). The forests contribute greatly to the wealth of the country.

DENMARK.

Denmark (15,000 sq. miles), consisting of a peninsula and numerous islands, has a very large extent of coast line, but few good harbours; the shores, except on the east, being sandy, with many lagoons. The shallow, winding Little Belt, between the mainland and Fyen, the broader and deeper Great Belt, between Fyen and Zealand, and the Sound, between Zealand and Scandinavia, are all important, for they lead from the Baltic to the North Sea, and a great volume of the trade between eastern and western Europe passes through them. The name of the capital, Copenhagen, on the Sound, illustrates the importance of this trade route. Its English form would be Chipping Haven, that is, Trading Haven, or Market Haven¹.

The Baltic Heights extend into the southern portion of Jutland and the islands, nowhere rising over 600 feet. The peninsula of Jutland, though forming about two-thirds of Denmark, contains less than half the population. Four-fifths of the country is productive, rather less than half being arable land, and about the same pasture. Forests occupy one-twentieth of the productive area. Peat bogs are found in the west and north of Jutland. Dairy farming is the great occupation of the country, and is carried on by the best scientific methods. Butter is the chief export. Glove-making is important. The Faroes, or Sheep Islands, several of which are uninhabited, are engaged in sheep-farming and fishing.

Copenhagen, the capital, the only town of any size, presents a beautiful appearance when approached from the Sound; 'a vision of steeples and palaces rising from the sea on a rich background of green.' The other towns are ports, or ferry towns. There are no long railways, but the trains are run on to large ferry boats, and thus direct communication is maintained between shore and shore.

¹ Chipping is an old English word used in these senses in such names as Chipping Norton, in the Cotswolds.

ICELAND.

Iceland (40,000 sq. miles) is a large mountainous island in the Arctic Ocean, with a fiord coast except on the south. The only lowlands are in the south and south-west, and are of very small extent. The island is volcanic, Hekla being the best known of over a hundred volcanoes, active or extinct. Geysers, or hot springs, throwing up fountains of hot water at intervals, are also of volcanic origin. The greater part of the island, which rises to a height of 6,400 feet, is covered with snow, and the valleys are filled by glaciers, from which issue short rapid rivers forming waterfalls. The climate is too cold for agriculture, but the pastures are rich in the short summer, and feed excellent sheep, cattle, and ponies. Fishing is important. Only the coast and the lower valleys are inhabited. The capital is Reykjavik, in the south-west.

THE GERMAN EMPIRE.

Notice in fig. 65 how great a part of Central Europe is occupied by the German Empire (210,000 sq. miles), which stretches from the Alps to the Northland seas. Notice that on every other side it is bounded by land, so that the fact that most of its rivers flow north to German waters, and are navigable for a great part of their course, is of the greatest importance.

Germany is divided into North Germany, occupying the plain, broken by the Baltic heights in the north-east, and by outliers of the central highlands in the west, and South Germany occupying the highlands. (See figs. 67, 68.)

Rivers. Look out on fig. 68 the rivers which drain North Germany, and observe the general similarity of their courses. Beginning from the east North Germany consists of the lower courses of the Niemen (or Memel) and the Vistula, both opening to great lagoons, the former with Memel, the latter with Danzig at its mouth. The timber trade of the Vistula is very important.

Both of these are Russian rather than German rivers, but the

Oder, to the west, though it rises beyond the German frontier in Moravia, is German for the greater part of its course. Short tributaries on its left bank drain the pine-forested slopes of the Riesen Gebirge, or Giant Mountains, which separate Silesia from Bohemia. The main stream flows across the plains of Silesia, through an agricultural land decreasing in fertility to the north and east, where some wheat, but much more rye, potatoes, sugar-beet, and flax are grown. Sheep are fed in the mountain districts, and their wool is manufactured in a number of small towns. On the Silesian coal-field in the south-east of the Oder basin is Breslau, on the main river, the capital of Silesia, manufacturing cotton, woollen, and linen fabrics. Frankfurt-on-the-Oder is a sugar manufacturing town, in the centre of the sugar-beet district. Stettin, at the head of the lagoon, or haff, of the same name, is a shipbuilding centre, where some of the largest liners are built, and an important port.

The Elbe Basin. The Elbe is the most important river of North Germany. Its tributaries make it the outlet of a large and wealthy hinderland. It rises beyond the German frontier in Bohemia, where its many tributaries drain the mountains which enclose Bohemia, the Erz Gebirge, or Ore Mountains, on the north-west; the Böhmer Wald, or Bohemian Forest, on the south-west; the Riesen Gebirge, or Giant Mountains, and the other ranges which make up the Sudetes Mountains on the north-east; and the Moravian Highlands on the south-east. Look out the position of all these in figs. 67, 68, and notice how they enclose the diamond of Bohemia between them. The line of the Bohemian Forest is continued through the Fichtel Gebirge, or Fir Mountains, the Thüringer Wald, or Thuringian Forest; the line of the Sudetes is carried in a more broken manner through the detached Harz Mountains towards the Weser Highlands in the north-east, while the line of the Erz Gebirge is continued through the Fichtel Gebirge and the Franconian and Swabian Jura to the Rhine, and beyond the Rhine as the Swiss Jura.

The Elbe, after receiving its Bohemian tributaries, enters Saxony in a fine gorge, between the outliers of the Sudetes on the east, and of the Erz Gebirge on the west, forming a picturesque region of perpendicular valleys of great depth, and isolated flat topped hills, known as the Saxon Switzerland. It leaves the mountains as a broad, shallow stream, not always navigable in dry seasons, and passes Dresden, the capital of Saxony, a handsome town, with fine art galleries,



FIG. 75. Routes from Berlin, indicated by lines showing time required in travelling by express train. All places in the darkest area are within two hours' journey of Berlin, all in the white area are over ten hours' journey from Berlin.

public gardens, and beautiful pine-forested environs. Below Dresden it flows across the plain, with marshy or forest land on its right bank, and on its left agricultural districts cultivated with potato and sugar-beet. Its tributaries on the left bank drain the German slopes of the Erz Gebirge, the Thuringian Forest, and the eastern slopes of the Harz. The most important are the Mulde, round which is the Saxon coal-field, with the manufacturing and mining towns of Chemnitz and

Freiberg, and the Saale, formed by the union of tributaries from all the mountains just named, which supply timber in its many forms, and feed the sheep which yield the famous Saxony wool, from which Saxony flannel is manufactured. The Erz Gebirge, or Ore Mountains, are rich in minerals, as the name suggests. The chief towns of the Saale basin are Leipzig, on its tributary the Elster, the centre of the German publishing



— Navigable Rivers, - - - Canals, - - - - Canals Projected

FIG. 76. The Navigable Waterways of Central Europe.

trade, and Halle. Not far below the confluence of the Saale is Magdeburg, a fortress of great strength, a centre of the sugar manufacture. On the right bank the Elbe receives the Havel, on a tributary of which, the Spree, stands Berlin the capital, a town whose magnificent buildings, streets, promenades and gardens date mainly from the last forty years. Like all modern capitals it is the centre of many industries, especially

of those which supply luxuries for the wealthy resident population. It is the administrative centre of the Empire and the capital of the kingdom of Prussia. It is one of the great railway centres of the empire, and of Europe (see fig. 75). It is connected by canal with both the Elbe and the Oder, whose ports Stettin and Hamburg are, therefore, both ports of the capital. (See fig. 76.)

Hamburg, at the mouth of the estuary of the Elbe, has greatly developed with the growth of trade with the United States, and is now the greatest port of Northern Europe. The traffic down stream consists of the produce of its hinterland, especially the mineral wealth of Saxony and Bohemia and the manufactured articles of the Saxon coal-field. Hamburg is connected by canal with the Baltic port of Lübeck, on the Trave, the boundary between Schleswig-Holstein and Mecklenburg; Kiel, to the north of Lübeck, is connected with the Elbe estuary below Hamburg by the Kiel Canal, and the Elbe is thus in direct communication with the Baltic as well as with the North Sea.

The Weser Basin. The Weser has only half its course in the plain, which is here narrowest between the sea and the highlands. It is formed by the Werra from the Thuringian Forest, and the Fulda, from the highlands of Hesse, both beautifully wooded. On the east, separating its basin from that of the Elbe, rise the Harz Mountains, rounded, forest-clad hills, rich in minerals, the highest point of which is a bare round-topped hill, the famous Brocken. The Weser leaves the highlands in a narrow gorge, known as the Westphalian Gate, and flowing across the cultivated plain receives the Aller, with its tributary, the Leine, on which stands Hanover. This town, and Brunswick, are the two principal towns of the agricultural district between the Elbe and the Weser, both containing many of the fine old-timbered houses which make the Harz towns so picturesque. The port of the Weser is Bremen, at the head of the estuary, the rival of Hamburg for the trade of Central and Southern Germany.

The Danube Basin. The Danube is the only German river which does not flow north. Look at figs. 67, 68, and trace its upper course in Germany, between the German Jura and the Bohemian Forest on the north, and the Bavarian Foreland on the south. Its source is in the Black Forest, a few miles only from the Rhine; it receives tributaries on the left bank from the Swabian and Franconian Jura, and on the right bank from the Bavarian Foreland. The latter are too swift for navigation. The most important are the Iller, with the cathedral town of Ulm at its confluence, and the Lech, flowing past Augsburg. Both Ulm and Augsburg were important route and trading towns in the Middle Ages, as was also Ratisbon, or Regensburg, at the confluence of a tributary from the Bohemian Forest on the left bank. All these are still important points on the great route to the east by the Danube valley. The last important German tributary of the Danube is the Isar, on which is Munich, the capital of the kingdom of Bavaria, one of the finest modern cities in Europe. The Bavarian Foreland is covered with pine forests, with pastures on their lower slopes, where cattle are reared in large numbers. The flatter land along the lower courses of the rivers and along the Danube is cultivated.

The Rhine Basin. The Rhine is the only river which flows across both South and North Germany, between which it is an important link. The other rivers of Germany rise in the Central Highlands, the Rhine alone crosses them. Though both its source and its mouth are beyond German territory it is pre-eminently the German river, bound up with German song and tradition.

Look at figs. 67, 68, and trace the course of the Rhine across Europe, noting its many changes of direction, and the vast area drained by it and its tributaries. It rises in the Alps by two main streams, flowing north through magnificent scenery to the Lake of Constance. On leaving this lake it turns west, and passes in a narrow valley between the Swiss and German Jura, forming the falls of Schaffhausen. It then

turns north again, and enters a fertile plain, from twenty to twenty-five miles wide, bounded by the pine-forested slopes of the Black Forest, with their rounded summits, on the east, and the similar but lower Vosges on the west. This plain, which forms part of the Grand-duchy of Baden, is one of the richest in the world, and is highly cultivated. Though the winters are cold the summers are hot, and the autumns are dry and warm. The sunny slopes of the hills are terraced for vineyards. The plains are planted with every kind of grain, as well as with hops and tobacco. Fruits come to perfection, and many of the highroads are lined with fruit-trees, of which the cherry is perhaps the commonest. The valleys running up into the hills are hardly less rich. Their bottoms and lower slopes are cultivated in the same manner as the plain, while higher are beautiful meadows, above which rise the dark pine woods from which the Black Forest takes its name. The brooks which rush down the valleys turn saw mills, in which are sawn the timber cut on the hill-sides above. The peasants are skilful wood-carvers, and make carved clocks and other fancy wooden articles, as well as wooden toys. The picturesque peasant costume, often differing from valley to valley, is still largely worn in the Black Forest and Vosges, and few spots present a more delightful picture than the villages, with their quaint wooden houses half buried in fruit-trees. The chief towns of this Upper Rhine Plain are Freiburg, a busy university town, with a fine cathedral, situated at the mouth of one of the most beautiful valleys of the Black Forest; the great fortress, university and manufacturing town of Strassburg; the cotton towns of which Mühlhausen is the most important; and Karlsruhe, connected with the Rhine by a ship canal, with engineering works. The first important tributary is the Neckar, on the right bank, which drains the Swabian Jura, flows past Stuttgart, the capital of the kingdom of Württemberg, and enters the Rhine after passing between the Odenwald and the northern outliers of the Black Forest in a narrow forested gorge, at the mouth of which stands the

university town of Heidelberg, with its romantic ruined castle. The cathedral towns of Spire and Worms lie in the plain, just above and just below the busy river port of Mannheim, where the Neckar enters the Rhine. The Main, the most important of the Rhine tributaries, enters on the right bank some sixty miles below the Neckar. Look at the map, and notice how its head-streams collect the waters of the Fichtel Gebirge and the Franconian Jura, as it flows across the kingdom of Bavaria. The chief town of the upper Main is Nürnberg (Nuremberg) on a tributary, a famous commercial and artistic town in the Middle Ages, and now a busy manufacturing town. Its walls and towers still stand, and its magnificent churches and old houses make it one of the most interesting cities of Germany. Hops are largely grown all over Bavaria, which is famous for its beer. On the lower Main the chief city is Frankfurt-on-the-Main, an old historical city, now largely rebuilt. It is a trading and banking city, and has become an important river port by the deepening of the Main. Mainz, at the confluence of the Main and Rhine, is also a manufacturing city and river port. A little below Mainz the Rhine again turns north and enters its beautiful gorge. The hills enclosing it are forested, or covered with terraced vineyards, while on every crag is the ruin of some robber baron's castle, towering over the small towns which stand at the water's edge, wherever the gorge widens a little. The river itself is a broad stream, crowded with passenger and cargo traffic, with an occasional raft of timber floating down to the woodless delta. About half way through the gorge the Rhine receives two tributaries entering almost opposite each other, the Lahn on the right bank, and the Moselle on the left. Coblenz, a busy port and manufacturing town, is built at the confluence of the Moselle, immediately opposite to the fortified rock of Ehrenbreitstein which reminds the traveller of Edinburgh castle rock. On figs. 67, 68 trace the course of the Moselle, which, with its tributary the Saar, drains the French slopes of the Vosges, flows past the

fortress of Metz, the capital of Lorraine, and enters the Rhine through a long forested gorge. To the west of its confluence with the Saar is Luxemburg, the capital of the small independent Grand-duchy of that name (area about 1,000 square miles). The main stream of the Rhine on leaving the mountains enters the North German plain, across which it flows in a north-westerly direction. Wheat and rye are grown on the agricultural land, as well as oats, potatoes and hemp. The Rhine flows past Cöln (Cologne), a city famous for nearly two thousand years, with the largest Gothic cathedral in Europe, a strong fortress, a port for ocean steamers, and one of the busiest towns of North Germany. Düsseldorf is a great port and manufacturing town, as is Duisberg at the confluence of the Ruhr. This tributary, entering on the right bank, flows through the busiest coal-field of Germany, on which are the towns of Barmen-Elberfeld, where all kinds of articles are manufactured, and Essen, where great modern guns are made. This coal-field also supplies coal cheaply by water to the manufacturing river-side towns already mentioned, as well as to Krefeld, a little west of the Rhine, the chief silk-manufacturing town of Germany. Soon after receiving the Ruhr the Rhine turns west, and begins to break up into numerous distributaries, forming the delta which is occupied by Holland.

The Rhine is navigable from Strassburg, in Alsace, to the sea, and forms the greatest waterway of Europe, carrying immense freights in either direction, binding together north and south and enabling them to exchange their products, agricultural, mineral, and manufactured. Ocean steamers reach Cöln, where their freight is transferred to river steamers. The commerce of these river ports, which have already been named, is in some cases more valuable than that of first-class ocean ports.

THE NETHERLANDS.

The Netherlands, also called Holland, or the Low Countries (area about 12,600 sq. miles), occupies the delta of the Rhine. Notice in the map in fig. 67 how it is crossed by the distributaries of that river, which have created a great part of the country by the process already described (see p. 14). Notice that there are no hills, and that the sea has eaten into the land, leaving remnants of the old coast line in the numerous islands. The Zuyder Zee is so enclosed by islands as almost to form an inland lake.

The coast of Holland is everywhere low, and except for a border of low sand dunes is often below the sea-level. To keep the sea from flooding it strong dykes have been built, and the low-lying polders, or meadows, are pumped dry by means of windmills, which are seen everywhere in Holland. Where the land is marshy it has to be drained, and the rivers have to be prevented by embankments and canals from cutting new channels across the soft soil. When all this has been done Holland is a fertile country, of which rather more than a quarter is agricultural land, and half as much more pasture land. The chief crops are rye, potatoes, hops, sugar-beet, and tobacco, and some wheat is also grown. Dairy farming is very important. The Dutch are famous cultivators of flowers, especially of bulbs, which do well in the loose soil. Manufactures are important and growing.

The position of Holland makes it the outlet of Western Central Europe, and a great volume of trade passes along the Waal (which receives the Maas, or Meuse, from the plateau of Lorraine), the Lek, and the Rhine, the principal distributaries of the Rhine. Rotterdam, on the Lek, is one of the greatest ports of Europe. Amsterdam, on the Zuyder Zee, is a shipping, banking, and commercial town, and the great diamond-cutting centre of Europe. The capital is The Hague ('s Gravenhage), on the east coast. Utrecht, at the limit of the area liable to flood, is the most important town in the centre of the country.

BELGIUM AND FRANCE.

Look at the map of Europe west of the Rhine in figs. 77, 78. Notice that like Germany and Holland it consists of a lowland in the north, broken by the heights of Normandy and Brittany along its northern margin, and of highlands to the south. The lowland is narrowest in the east, where the highlands approach nearest to the North Sea, forming the kingdom of Belgium (area about 11,500 sq. miles). France (area about 204,000 sq. miles) occupies the remainder, extending from the English Channel, in the north, to the Mediterranean, in the south, and from the Atlantic, in the west, to the Vosges, in the east. The lofty Pyrenees, stretching from the Bay of Biscay in the Atlantic, to the Gulf of Lions, in the Mediterranean, separate it from the Iberian peninsula in the south west, while in the east the Jura cut it off from Switzerland, and the Alps from Italy.

Look again at the map and notice that this lowland is broadest in the west, where it stretches right across France from the Channel to the Pyrenees. It consists of four river basins (1) that of the Meuse and Scheldt, which flow to the Rhine delta, the northern part of the basin forming Belgium; (2) the Seine basin, drained to the Channel; (3) the Loire basin in the west, drained to the Bay of Biscay; (4) the basin of the Dordogne-Garonne, in the south-west, drained to the Bay of Biscay. All these, except the Garonne, which comes from the Pyrenees, rise in the Central Highlands.

The central part of the highland area is known as the Central Plateau. It is connected by the Plateau of Langres with the Vosges. To the east of the Central Plateau, separating it from the Jura and the Alps, is a smaller lowland, forming a fifth river basin, that of the Saône-Rhone. This lowland passes in the south-west into the lowland of Languedoc.

Trace on the map the course of these rivers. It will be seen from their direction that the Central Plateau is lowest in the north-west, and rises gradually to the south and east. It is highest on the east and south margins, where it is known

as the Cevennes. The Cevennes, seen from the deep Rhone valley, which they border on the west, have the appearance of high mountains.

This Central Plateau is the poorest and most thinly populated part of France, with the exception of the upper slopes



FIG. 77. Physical Features of France and the Bordering Lands.

of the Alps and Pyrenees. It consists of high undulating plateaus, covered with poorish pastures, and of bare limestone tablelands. In the limestone the rivers cut very deep, narrow gorges, with sheer sides. In some the river bed is as much as 1,500 feet below the level of the plateau. Outside the limestone districts the valleys are wide, with sloping sides,

which are cultivated. Towards the centre of the plateau is a region of extinct volcanoes. Large areas are covered by lava sheets, on which little will grow, and many volcanic cones rise above the plateau. The highest of the volcanic mountains is the Mont Dore, 6,000 feet high. Two deep



FIG. 78. Key to Physical Features of Fig. 77.

rifts opening to the north, form the valleys of the Loire and Allier. The soil of the latter is composed of very fine volcanic dust, and is extremely fertile. The limestone heights (the Plateau of Langres) recall the Cotswolds. This plateau passes in the east into the plateau of Lorraine at the base of the

forested Vosges. The Ardennes, to the north of the Lorraine plateau, the eastern continuation of the Lower Rhine Highlands, are wooded hills of the same type.

Climate and Products. The climate of Belgium and the North of France differs little from that of Southern England. The orchards of Normandy, from which large quantities of cider are made, are famous. Wheat is largely grown, and until lately France produced one quarter of all the wheat grown in Europe. The other crops are cereals, root crops especially sugar-beet (figs. 70, 71), and flax in the east.

The summer heat increases to the centre and south, and the vine ripens south of a line drawn from the mouth of the Loire to the Ardennes, except on the higher parts of the plateau. The south of France has the Mediterranean climate of winter rains and hot dry summers, and the olive, orange, lemon, mulberry, and other Mediterranean fruits ripen.

The mineral wealth is not great. The largest coal-field is in the Sambre-Meuse basin, and on it are situated the industrial towns of Belgium and North-east France. A smaller coal-field is found round St. Etienne in the Central Plateau between the upper Loire and the Rhone on which iron industries are carried on. The other manufacturing centres of the north obtain their coal supplies from abroad. This is made easier by the large number of excellent waterways, both rivers and canals, which cover the lowlands, especially in the north. Cotton is brought up the Seine to the manufacturing towns of the lower Seine and thence by canal to the cotton towns of the Vosges. Wool, obtained from the sheep of the Ardennes or brought mainly from South America either by the Seine or the Scheldt, supplies the woollen towns of Belgium and the adjacent parts of France. The flax manufactured in the same district is locally grown. Silk is manufactured in the south, especially in the Rhone valley, where silkworms are reared and coal is easily obtained from the St. Etienne coal-field.

BELGIUM.

The kingdom of Belgium is purely a political division. It consists of a lowland and a highland area. The narrow lowland of Flanders and Brabant, drained by the Scheldt and its tributaries, widens out west and east into the lowlands of France and Germany. The highland of the Ardennes, across which the Meuse passes in a gorge like that of the Lower Rhine, is covered with forests and pastures supplying timber and wool. Agriculture is important in the lowlands, except in the marshy north. The Franco-Belgian coal-field runs along the Meuse and Sambre, on both sides of the frontier (fig. 74). At the east end zinc and iron are mined, and Liège, where the Meuse turns north, is a great engineering centre. Many other towns on this coal-field manufacture iron and textiles, and the population is almost as dense as on the Lancashire coal-field. The waters of the Scheldt, and its tributary, the Lys, are excellent for bleaching, and have helped to develop the manufacture of linen from local flax. Ghent, at the confluence of the Lys, is the chief textile centre, manufacturing cotton and wool. Antwerp, at the mouth of the Scheldt estuary, is a great port, both for Belgium and West Germany. Ostend is a packet station. Brussels, the capital, in the centre, with fine ancient buildings and modern streets, manufactures lace.

FRANCE.

Northern France. Northern France, on the eastern end of the Franco-Belgian coal-field, is a busy industrial region. Many towns are engineering centres, or manufacture cotton, linen, and wool. Lille, near the Lys, Valenciennes, on the Scheldt, and St. Quentin and Amiens, on the Somme, are the chief. Dunkirk, on the North Sea, is a large and rising port. Calais and Boulogne are packet and fishing stations. (See fig. 79.)

The Seine Basin. The Seine basin, with the upper courses of the Meuse and Moselle, is a land of limestone scarps and clay plains, resembling the Thames basin. Sheep are kept on the hill pastures, and the steep slopes facing the sun are

terraced for vines. Numerous cotton-manufacturing towns lie round the base of the Vosges, of which Nancy, on a tributary of the Moselle is the chief.

Look at figs. 77, 78, 79, and trace the Seine and its tributaries.

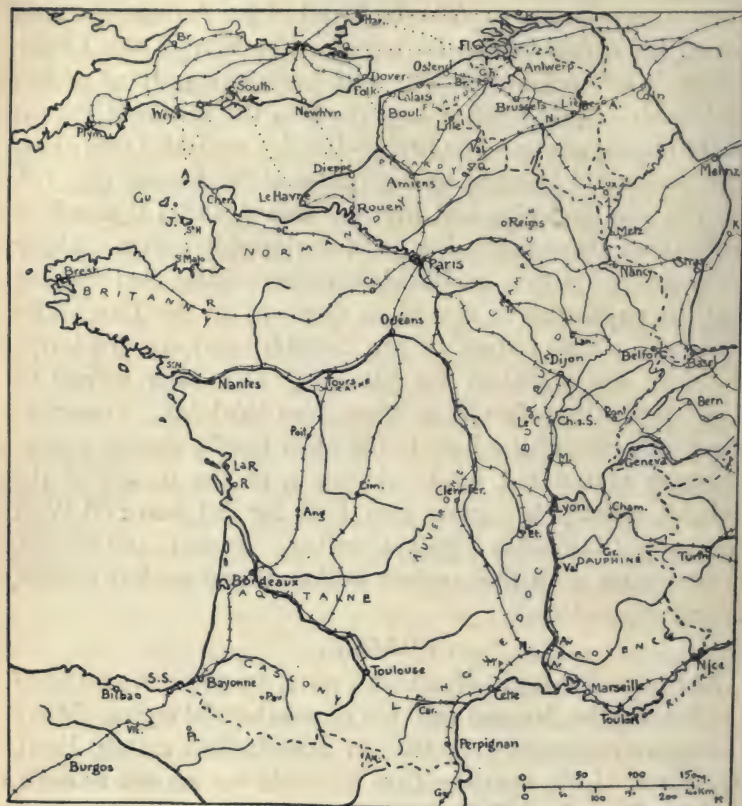


FIG. 79. Routes and Towns of France.

The main stream flows north-west from the Langres plateau to the Channel. Its chief tributary, the Marne, on the right bank, comes from the plains and heights of Champagne, whose hill vineyards yield the famous wine. Reims, an old cathedral city, is the centre of the Champagne district, and a

woollen centre. Paris, the capital of France, a little below the confluence of the Marne, is a magnificent city, with broad tree-lined streets, great squares, and fine ancient and modern buildings. It manufactures many articles of luxury and beauty, and is an important port. Up to Paris the Seine is navigable for smaller sea-going vessels, while ocean liners reach Rouen, the Manchester of France, the centre of the cotton manufacture of the Lower Seine, with a fine old cathedral. Le Havre, at the mouth of the estuary, is the chief port of Northern France, and 'the haven' of Paris, with a great American and English trade.

The Norman Highlands consist of chalk pastures, with fertile valleys rich in orchards and corn lands.

The Loire Basin. The Loire is the longest river of France. Trace its course on the map, and measure its approximate length. The main stream, and its chief tributary, the Allier, rise less than 100 miles from the Mediterranean, in the Cevennes, and flow north through the broad rifts in the plateau already mentioned. St. Etienne, on the coal-field between the Loire and the Rhone, is the chief industrial town of the plateau, and Clermont, on the edge of the fertile Allier rift overlooked by the Puy de Dome and other volcanic cones of Auvergne, the capital. Orleans is built where the Loire turns west, to flow through Touraine, 'the Garden of France.' Nantes, at the head of the estuary, and St. Nazaire at the mouth, are the ports of the Loire. The highlands of Brittany to the north resemble Cornwall and Devon in scenery, climate, and products. Brest, in the extreme west, is the Atlantic naval station.

The Garonne-Dordogne Basin. The Garonne rises in the Pyrenees, and flows past the ancient city of Toulouse, across the fertile plain of Aquitaine, receiving on its right bank the Tarn, with its extraordinary limestone gorge, and, a little below the estuary of the Gironde, the Dordogne from Auvergne. Bordeaux, at the head of the estuary, a great port, is the outlet for the wine districts of the lower Garonne,

which produce claret. South of the Gironde the coast is bordered by sand dunes, whose progress inland has been checked in recent years by planting pinewoods.

The Saône-Rhone Basin. The Saône-Rhone valley is the great natural route from the Mediterranean to the north (see fig. 79). Notice in fig. 77 what an important break it makes between the highlands on either side. Trace the course of the Saône, and see how near it flows to the head waters of the rivers of the Moselle, Meuse, and Seine basins, and how, by the valley of its tributary the Doubs, it is connected between the Vosges and the Jura with the middle Rhine plain. The steep slopes of the mountains on the right bank produce the wines of Burgundy. Dijon, on a tributary, is the centre of this district. Lyon, at the junction of the Saône and Rhone, is the centre of the silk manufactre. Below Lyon the united river, know as the Rhone, receives on its left bank two tributaries, the Isère and the Durance, from the lofty Alps of Dauphiné. The valley widens out to the rich plain of Languedoc, famous for wine, and the hill land of Provence, famous for olive oil. The Rhone forms a great delta, with shifting mouths, and the port of the valley, Marseilles, is to the east of the delta. It is a magnificent city, one of the greatest ports of the Mediterranean, and the centre of many industries. Cette, on the Gulf of Lions, exports the wines of Languedoc. Toulon, east of Marseilles, is a naval station. The coast beyond, called the Riviera, is famous for its beauty, and mild winter climate. Nice is the most famous of its many health resorts. Monaco is a small independent principality.

SPAIN AND PORTUGAL.

Look at the map of the Iberian peninsula, and see how it differs from France in structure (fig. 80). Instead of extensive lowlands with a central highland, the greater part of the peninsula is occupied by a lofty plateau, called the Meseta, with only three considerable lowland areas. The lofty wall of the Pyrenees, rising in the highest peaks to over 11,000 feet, cuts

it off from France. The scenery is extremely grand and rugged, with magnificent forests of oak and beech on the lower slopes. The Pyrenees are continued along the Bay of Biscay by the Cantabrian Mountains, rising steeply on their northern side, and sloping more gently on the south to the high plain of Castile which lies 3,000 feet above the sea.



FIG. 80. Physical Divisions of Iberia.

The Ebro, flowing from these mountains south-east to the sea, crosses the lowland of Aragon, which lies between the Pyrenees and the high north-eastern edge of the Meseta, called the Iberian Mountains. The Meseta, which slopes west to the Atlantic, is crossed by three long parallel rivers, which flow in gorges deeply sunk below the level of the plateau, and are useless for communication or navigation till

they reach the lowlands near the sea on the west. They are the Douro, whose upper basin forms the lofty plains of Old Castile, the Tagus, separated from it by the Castilian Mountains, and the Guadiana, beyond which rises the southern margin of the Meseta, called the Sierra Morena. South of the Meseta is the lowland plain of Andalusia, crossed by the Guadalquivir, with the Sierra Nevada on the south. The third lowland is in the south of Portugal, which consists of the lower basins of the Douro, Tagus, and Guadiana. (Area about 34,500 sq. miles.) The remainder of the Iberian peninsula is occupied by Spain. (Area about 191,000 sq. miles.)

Climate and Products. The climate of Northern Spain differs greatly from that of the south. The north receives rain all the year round, the south has the Mediterranean climate with winter rains. The lofty mountains to the north prevent the moist Atlantic winds from reaching the interior, which is one of the driest parts of Europe. The northern slopes of the northern mountains are forested, but the Meseta is bare. Sheep and goats are kept on the indifferent pastures it yields, and are driven to lower levels in autumn, as the winter on the high, exposed plateau is very severe. Agriculture is carried on in the lowlands, but irrigation is generally necessary, except in the north. This is difficult on the plateau, as the deep gorges of the rivers make their waters inaccessible, and the smaller rivers run dry in summer. Careful irrigation has made of Murcia and Valencia, the Mediterranean provinces of the east coast, veritable gardens, in which are grown olives and oranges, rice and sugar cane, while in one district the date palm ripens. Andalusia is less fertile than it would be if more care were devoted to irrigation. It is famous for its horses. In some districts of southern Spain and Portugal there are forests of evergreen oaks, in which large herds of swine are fed. The mineral wealth is considerable. The Cantabrian Mountains are rich in iron, which is exported to South Wales from Bilbao and Santander, and in coal. Copper and quicksilver are mined

in the southern mountains, but mining, like agriculture, is less developed than it might be. The only manufacturing town of importance is Barcelona, on the north-east coast, which makes textiles, chiefly cotton. The vines produce wine, or their grapes are dried into raisins, which, with oranges and other Mediterranean fruits, are exported from Valencia and Malaga. The chief wine ports are Cadiz, exporting sherry, and Oporto, in Portugal, exporting port.

Towns. Lisbon, on the estuary of the Tagus, finely situated on hills above the river, is the capital of Portugal and an important port of call. The capital of Spain is Madrid, on a tributary of the Tagus, situated on a high bleak plain, nearly 2,500 feet above the sea. The other towns of importance in addition to the ports already mentioned, are Zaragoza, in the Ebro valley, Seville, the capital of Andalusia, on the Guadalquivir, and Granada, on a tributary, at the foot of the Sierra Nevada, with the famous palace of the Moorish kings called the Alhambra. Gibraltar, in the extreme south, a lofty rock nearly 1,400 feet high, connected with the mainland by a low isthmus, commands the strait of the same name where the Mediterranean is narrowed down to 9 miles, between the projection of the Spanish coast southwards, and the projection of the African coast northwards. It is held by Britain, and is strongly fortified.

THE ALPINE LANDS.

The two remaining Mediterranean peninsulas are cut off from Central Europe by a broad belt of lofty mountains. This consists of the Alps in the west, beginning at the Mediterranean, running north to the east of the lower Rhone valley, and gradually curving eastwards. They are separated from the Central Highlands of Europe by the upper Danube valley. The Alps broaden to the east, where the Danube valley narrows between them and the southern mountains of Bohemia. From their broad eastern margin spring the Dinaric Alps at the southern end, extending along the Dalmatian coast



FIG. 81. Physical Features of Alpine and Karpian Lands.

of the Adriatic. From the northern end the great semicircle of the Karpathians curves round, enclosing Hungary, the broad plain of the middle Danube, which has broken through, between the Alps and the Karpathians, in what is called the Hungarian Gate. (See fig. 81.)

The Alps. We are accustomed to think of the Alps as in Switzerland, but politically they are in five countries, Italy,



FIG. 82. The Western and Central Alps and the Routes across them.

France, Switzerland, and Austria, while a little strip is in Germany. They are broadest in Austria, while the highest summits, Mont Blanc, and Monte Rosa, both over 15,000 feet, are in France and Italy respectively, though close to the Swiss frontier. The easiest approaches to them are, however, in Switzerland, which contains the largest glaciers of the Alps, the upper courses of three out of the four great rivers which drain them, and much of the most magnificent scenery.

Look at fig. 82, and find the St. Gotthard group, from which flow the rivers mentioned—(1) the Rhone, flowing to the Gulf of Lions; (2) the Rhine, flowing to the North Sea, and two of its tributaries, the Aar, flowing through the lakes of Brienz and Thun, and the Reuss, flowing through the lake of Luzern to the Aar; and (3) the Ticino, one of the head streams of the Po, flowing to the Adriatic. Notice how these river valleys radiate like the spokes of a wheel from this centre, which commands the routes along all of them.

The Rhone rises in a great glacier and flows west in a deep valley, which separates the Bernese Alps on the north, from the Pennine Alps on the south. It turns north near the foot of Mt. Blanc, and breaks through the mountains to the blue lake of Geneva through which it flows. On leaving the lake it flows round the southern end of the Swiss Jura, and west to the valley of the Burgundian Saône, which it enters at Lyon. Its tributaries, the Isère and Durance, drain the outer margin of the Western Alps, between Mt. Blanc and the Mediterranean.

The Rhine flows in a direction exactly opposite to the infant Rhone, and after receiving a second head-stream turns north, cutting its way through the mountains to Lake Constance, through which it flows. On leaving the lake it turns west, receiving the Aar, which collects the waters of the valleys opening to the north, many of which are filled by long, narrow, mountain-girt lakes of great beauty, and of Lake Neuchâtel, at the base of the Swiss Jura. The Rhine flows west between the Black Forest and the Jura, and then turns north where Basel is built and enters Germany.

The Ticino flows south in a direction exactly opposite to that of the Reuss, through Lake Maggiore, which corresponds in situation with Lake Luzern. Look at the map and notice that the Ticino valley is but one of many parallel valleys running south, some with lakes similar to those of the valleys opening northwards. All these valleys but one are drained south to the main stream of the Po, which flows at right angles to them, having risen in the Western Alps, near the source of

the Durance. Notice the river of the one parallel valley which is not drained to the Po. It is the Etsch, or Adige, which runs to the west of the Ortler group, and flows to the Adriatic by a course parallel to the Po. (See fig. 82.)

The Danube, the fourth of the great Alpine rivers, rises in the Black Forest, and receives only one tributary from the Swiss portion of the Alps, the Inn. Notice that east of the Inn the valleys of the Eastern Alps run from west to east, and that their waters are carried to the Danube by the Drave and Save, both of which, after leaving the mountains, have long courses across the Hungarian plain (fig. 81). The main stream of the Danube, after receiving the Inn, flows in a magnificent gorge through the Austrian Gate, between the outliers of the Alps and of the Bohemian Forest. Its valley then widens to the plain on which Vienna is situated. After passing Vienna it flows past Pressburg, where at the Hungarian Gate the highlands again approach the river for a short distance. It now flows first east and then due south across the Hungarian plain as a broad and noble stream; its surface diversified by numerous wooded islands. It turns east again below the confluence of the Drave, and breaks through the Karpathians in a gorge of great beauty, the sides of which in places reach 2,000 ft. At the Iron Gate, now made navigable, it enters the plain of Valakhia, which it crosses to the Black Sea, forming a large and swampy delta.

The general character of the Alps is the same throughout their whole extent. Along the line of greatest height many peaks rise above the snow-line, and are separated from each other by vast snow-fields and valleys filled by glaciers. Below the snow-line are the alps, or summer pastures, where flocks are fed in summer, yielding the famous Swiss milk, cheese, and skins for glove-making and other uses. Lower down the valley the forests begin, the uses of which have already been described. Permanent dwellings are few in the forest zone, but increase as the valleys descend to the level where agriculture can be carried on. In summer the Alps become

'the playground of Europe,' and are crowded by thousands of visitors, for whom are built large hotels as near as possible to the snow-line.

There are many passes across the Alps, of varying height and difficulty. The chief railway routes are (1) the Mont Cenis route, which uses tributaries of the Isère and the Po, (2) the Simplon Route, using the upper Rhone and a tributary of the Ticino, (3) the St. Gotthard, using the Reuss and the Ticino (all with long tunnels through the core of the Alps), (4) the low Brenner route, using the valleys of the Inn and the Adige. (See fig. 82.)

The Jura are part of the Alpine system, but much lower. They consist of broad ridges and hollows, with picturesque valleys, ravines, lakes and pine-forests. Cattle-keeping is important, and many busy manufactures are carried on in the numerous small towns.

The Karpathians are highest in the east, where they rise to near 9,000 feet. The greater part of the range, however, does not rise above the tree-line, and is thickly forested. The waters of the Karpathians reach the Danube by the Tisza (Theiss), on the right bank, not far above the confluence of the Save. Notice that the tributaries of the Tisza flow in long parallel valleys, running east and west. (See fig. 81.)

SWITZERLAND.

The federal republic of Switzerland (area about 16,000 sq. miles) occupies the plateau between Lakes Geneva and Constance, with the bordering Jura to the north, and the Alps to the south-east. The climate is in general that of Central Europe, except in the mountains, where the temperature is lower. The Alpine area is engaged in pasturage, supplying condensed milk and cheese, agriculture, and in providing for tourists in summer. The industrial towns are on the plateau. There is no coal in Switzerland, and industries are carried on, either by imported coal or by water power, which is very abundant. This is used in the various electrical industries,

which are important all over Switzerland. Villages and hotels almost at the snow-line are lighted by electricity, and most of the mountain railways are driven by electric power. The chief industries are the silk manufacture, materials for which are obtained from Italy by the St. Gotthard route, carried on chiefly at Zürich and Basel, cotton, manufactured round Zürich and St. Gall, and the manufacture of textile and electrical machinery with Zürich as the centre. There are numerous small industrial towns in the Jura, where watch-making is carried on. Geneva is the commercial centre of this manufacture. The capital is Bern, on the Aar, in the centre of the plateau.

AUSTRIA-HUNGARY.

Compare Austria-Hungary (area about 241,000 sq. miles) in figs. 81 and 83, and notice its varied surface. It includes the Alpine provinces of the Eastern and Dinaric Alps, of which Tirol, consisting of the valleys of the Inn and Adige, is the largest, Bohemia, with the adjacent lands of Moravia and Silesia, and parts of the old kingdom of Poland on the northern foreland of the Karpathians. The kingdom of Hungary consists of the lands within the horseshoe of the Karpathians, including the mountainous Transylvania in the south-east, and a narrow strip of land in the south-west, running to the Adriatic coast. This gives Hungary the advantage of a port. (See fig. 83.)

The Alpine Provinces. The Alpine provinces have already been described. The climate of the southern valleys is more genial than that of the northern, and the vine for wine and the mulberry for silkworms are largely grown in the Adige valley. The Alpine foreland, approaching the Danube, is good agricultural land. The climate of the narrow strip of lowland between the Dalmatian coast and the bare rugged Dinaric Alps, is that of the Mediterranean, with hot summers and very heavy winter rains. The vine, olive, and mulberry are cultivated, and goats are largely kept on the high limestone

pastures. The port is Triest. The other important towns of the Alpine region are Innsbruck on the Inn, at the northern end of the Brenner route, the capital of Tirol, Salzburg on a tributary, and Graz, on a tributary of the Drave, near a small coal-field, the only industrial town of the Alpine provinces. All three are situated in magnificent scenery.

Bohemia. Bohemia, enclosed between mountain walls, is chiefly drained north to the Elbe, on the most important



FIG. 83. Austria-Hungary. Routes and Towns.

tributary of which stands the capital Prag, a busy industrial town with engine works and other manufactures. Bohemia is rich in coal, and many manufactures are carried on. Paper is made in the forest districts. The manufacture of fine glass, cottons, woollens, beer, and sugar are all important, and support a dense population. Coal is also found in Moravia, which is a great woollen manufacturing region, and in Silesia. (Figs. 69-74.)

Austria. The lands north of the Karpathians have a more

extreme climate than that of Central Europe, and this becomes more marked as we go east (see fig. 57). The highlands are wooded, the lowlands are cultivated with wheat and other cereals and potatoes. This Karpathian foreland is rich in petroleum and in salt. Salt is mined near Cracow, the old capital of Poland, on the Vistula.

Vienna, the capital of Austria, on a rich plain, is built on the Danube, where the eastern spurs of the Alps reach that river. It commands the routes by the upper Danube, leading to Central Europe, as well as those of its lower basin. Routes from all parts of Europe pass through Vienna. The Danube is navigable both up and down stream, forming the longest waterway in Europe. The situation of the city between the mountains and the river is very picturesque. It is handsome and well built, with broad streets planted with trees, like those of most of the great cities of continental Europe. Numerous manufactures are carried on.

Hungary. Hungary consists of a plain, and much of the Karpathians by which it is enclosed. It is drained by the Danube and its tributaries. The climate resembles that of Eastern rather than that of Central Europe. The great wealth of Hungary is its fertile soil. It is one of the great wheat lands of the world, plains of golden grain spreading in every direction to the horizon. The vine is widely grown, and some Hungarian wines, especially those of Tokay, on the Tisza, are famous. The mountains are rich in minerals, and the forests supply timber for export. The lower lands near the Danube make rich pasture lands. Hungarian horses are fed on the grass lands, which are the eastern end of the great steppe of South-eastern Europe. Manufactures are only beginning, but are likely to become important, as raw material can be cheaply brought by the Danube. The capital is Budapest, on the broad Danube, a double city, consisting of Buda on the high right bank, and Pest on the flat left bank. Many bridges unite the two, which together form one of the handsomest, busiest, and most progressive cities of Europe. Flour-milling

is the most important industry. The port of Hungary, Fiume, on the Adriatic, exports flour, timber, wine, and the other produce of the country.

ITALY.

Look at the map of Italy (area about 110,500 sq. miles) and notice its long narrow structure (fig. 84). It is everywhere washed by the sea, except in the north, where it is cut off from Central Europe by the great horseshoe of the Alps. Notice that the only lowlands on the east are the plain of the Po, or Lombardy, which slopes from the west, opening in the east to the shallow head of the Adriatic sea, and the lowland of Apulia in the south. The Apennines run through the middle of the peninsula from north to south. To the west of the Apennines lie the highland of Tuscany, drained to the west by the Arno, the plains round Rome drained by the Tiber, and the volcanic plains round Naples, separated by marshes from the Roman plain to the north. The remainder of the peninsula is occupied by mountains, which slope to the seas on either side.

Climate, Products, and Towns. The climate of the lower slopes of the Alps is more genial than that of the northern Swiss valleys. Many of the lower slopes are clothed in luxuriant woods of chestnuts. The vine is largely grown in these sunny valleys, and mulberry-trees feed the silkworm, the raw silk being manufactured in the plain below. This plain has on the whole a Mediterranean climate, though the winters are severe. It is crossed by numerous streams from the Alps, which are used in many districts for irrigation, producing excellent pasture and agricultural land. Many famous cheeses are made, and poultry are largely reared for eggs, which are exported in large quantities. Rice is grown on the irrigated lands. Maize and other cereals are cultivated. The chief towns of the Lombard plain are Turin, in the west, at the termination of the Mont Cenis route across the Alps, Milan, at the termination of the St. Gotthard route, a busy industrial town, and the centre of the silk

manufacture of Northern Italy, Verona, at the end of the Brenner route, and Venice, a city of lagoons and islands, with canals for streets. Bologna in the south of the plain, at the



FIG. 84. Mountain Area, Plains, Rivers, and Towns of Italy.

foot of the Apennines, commands the chief routes across the mountains into Tuscany.

The Ligurian coast, or Italian Riviera, on the west is

extremely beautiful, with richly wooded rocky shores overhanging the blue waters of the Mediterranean. The largest town is Genoa, the chief port of the Mediterranean, magnificently situated on a wide bay backed by hills. The direct railway routes across the Alps make it a great centre for trade between northern and southern Europe.

The chief town of the Tuscan highland to the south is Florence, famous for its art treasures, situated on the Arno a little below where it leaves the Apennines. Tuscany is the land of the vine and olive, both of which are largely grown all over the Italian peninsula, though the olive does not ripen in Lombardy, where the winters are too cold. The trees of Tuscany and southern Italy are evergreen, the tall cypress and the bushy stone pine being the commonest.

South of Tuscany is the highland of Umbria drained by the upper Tiber, with many famous towns, built for the most part on the crests of the hills, the lower slopes of which are terraced for vines and olives.

Rome, the capital of Italy, lies in the plain of the lower Tiber, a few miles from the sea. It is situated on low hills, with beautiful views over the surrounding plain, or Campagna, to the wooded hills which enclose it. It contains the largest church in Europe, the cathedral of St. Peter, and innumerable smaller ones. These, like the numerous palaces, and particularly the Vatican, the residence of the Pope, contain priceless art treasures. Many ruins of the ancient city remain in the midst of modern streets.

Immediately south the country is marshy, but further south the plain on which Naples stands is one of the most fertile parts of Italy. The city lies on a magnificent bay, and above it towers the smoking cone of Vesuvius, an active volcano, whose eruptions do frequent damage. The lowland of Apulia, on the eastern side of the Apennines, slopes gradually to the sea. In addition to other Mediterranean products it grows a particularly hard wheat, which is made into macaroni, chiefly at Naples. Brindisi is a port of call for steamers

passing through the Suez Canal on the way to the east, where they take up and set down the mails which are dispatched by the quicker route overland.

Italian Islands. Calabria, the long western projection of Italy, is a thinly peopled mountain region, separated by the Strait of Messina from the island of Sicily. Sicily has an even more genial climate than the rest of Italy. Wheat and the vine are grown, and fruits, of which the orange and lemon are the most important. On irrigated lands many crops can be reaped in a year. The northern half of the island is occupied by a continuation of the Apennines of the peninsula. The volcano of Etna rises to the height of 10,000 feet in the east, above the town of Catania. The capital is Palermo on the northern coast. To the north of Sicily are the volcanic Lipari Islands, and to the south the small strongly fortified island of Malta, a British naval station. The island cultivates vegetables, which supply the early markets of Europe. Off the Tuscan coast is the small island of Elba. Further west lie the large mountainous islands of Corsica and Sardinia, the former belonging to France. Iron mining is important in Sardinia and Elba, and sulphur in Sicily. The other minerals are unimportant. No coal is found in Italy, in which agriculture is still the principal occupation.

THE BALKAN PENINSULA AND ROMANIA.

Romania. Look at figs. 81, 85, 86. Notice the plain of Romania lying between the Danube and the lofty Karpathians, which descend to the plain in steep forested slopes, cut by the valleys of the Danube tributaries. Note the sweeping curve of the Danube to the south-east till it is at last turned due east by hilly land. Its left, or Romanian, bank is low, and the river forms a network of channels, making approach to it difficult, and towns along it few. The plain is a great wheat land, the grain being carried down the Danube, and shipped from Galatz, at the head of the swampy

delta. Forests products are important in the Karpathian area. Cattle are kept in the hill pastures. The sunny slopes of the valleys are terraced for vines. The capital of Romania (area about 48,600 sq. miles) is Bukarest, in the centre of the plain, a handsome modern city with beautiful gardens.



FIG. 85. Physical Features, Routes, and Towns of Balkan Peninsula.

The Balkan Peninsula. Look again at the maps and notice that the Balkan peninsula lies entirely south of the Danube. It is essentially a mountain land, continuously so in the west, which is occupied by the Dinaric and Albanian Mountains. This western mountain region is occupied by Bosnia and

Herzegovina in the north, which is administered by Austria, and Albania. A set of parallel valleys open north to the Save and the Danube, the most important being the Morava, round which lies the kingdom of Servia. A similar set open south to the Aegean, a gulf of the Mediterranean, the most important being the Maritsa and the Vardar. Between these two sets of parallel valleys stretch in the west the rounded,



FIG. 86. Political Divisions of the Balkan Peninsula.

forested Balkans, sweeping round to the Karpathians where these reach the Danube. They separate Eastern Rumelia in the south from Bulgaria in the north. The latter, however, includes the upper Isker basin, south of the Balkans, the only river which breaks through that range. Between the Balkans and the Dinaric Alps the country is a rugged highland, with masses of higher land between the valleys. Notice that in this broader northern part of the peninsula the only lowlands

of any size, except those round the Danube, are the Maritsa lowland, running east through Eastern Rumelia, and south to the Aegean, the Morava lowland in Serbia, and the Vardar lowland in Macedonia.

To the south the peninsula narrows rapidly, and is still mountainous. The extreme south is a peninsula of very irregular shape called the Morea. It is cut off from the rest of the Balkan peninsula by the long Gulf of Corinth, which leaves only the narrow isthmus of Corinth, now crossed by a ship canal. The Morea, with an area of about the same size north of the Gulf of Corinth, forms the kingdom of Greece. The western coast of Albania and Greece is fringed by the Ionian Islands. The Aegean Sea, to the east of Greece, is thickly dotted with islands, forming an archipelago. Notice the remarkable extension of the Balkan peninsula in the extreme east, which brings Europe within a mile of Asia. Between the two is the Sea of Marmora, which narrows in the south to the Dardanelles, leading to the Aegean gulf of the Mediterranean, and in the north to the equally narrow Bosphorus, leading to the Black Sea. Here is built Constantinople, holding the passage from Europe to Asia.

Crete, in the Mediterranean, south of the Aegean archipelago, is independent.

Routes. The greater part of the Balkan peninsula is in a backward condition, having for centuries been misgoverned by Turkey, to which most of it, except Greece, belonged until a quarter of a century ago. Roads are few and bad, and communication is difficult. Notice in fig. 87 the importance of three valleys as natural routes. The Morava valley is connected by the valley of its tributary, the Nishava, and the Isker valley, with the Maritsa valley leading to the Aegean. This is the route followed by the line from Vienna and Budapest, which passes by Belgrad, on the Danube, the capital of Serbia; Sofia, the capital of Bulgaria; and Philippopolis and Adrianople on the Maritsa, to Constantinople. A second route follows the Morava valley, almost to its head,

and crosses to the Vardar valley, leading to Salonica on the Aegean. These valley routes have always been of great importance and are the most thickly populated part of the country.

Climate and Products. The climate of the Balkan peninsula resembles that of eastern Europe in the north and east, with



FIG. 87. The Routes and Towns of SE. Europe.

cold winters and hot summers. The mountains of the west coast are extremely wet, but the rainfall diminishes to the east. On the western coast and in the narrower south the Mediterranean climate with cool winters prevails. In the north and centre the mountains are covered with forests of oak and beech. In the west and south these are replaced by the evergreen trees of the Mediterranean, and olives, oranges,

lemons, and figs come to perfection. Maize is the chief cereal in Bosnia and Servia, and wheat in Bulgaria. The vine, tobacco, and mulberry for silk-worms are widely grown. Orchards of plum trees cover large areas in the north. Roses are grown for making perfumes, especially in the Maritsa valley. In Greece figs are grown, and small grapes which are dried into currants. Pigs are kept in the forests of Servia, sheep, cattle, and goats everywhere on the higher pastures. The mineral wealth, though considerable, is little used, and manufactures do not exist, except in the form of peasant industries.

Bosnia-Herzegovina. Bosnia and Herzegovina (area about 23,000 square miles) consist of a mountainous limestone country, rising to over 7,000 feet. The eastern mountains are densely forested. The country is very rugged, the rivers flowing in wild gorges. Coal and salt are abundant and are beginning to be mined. Roads have been made since the Austrian occupation. Such manufactures as that of paper from wood pulp are growing. Dried plums and timber are exported. The capital is Sarajevo, on a fertile plain surrounded by mountains. Mostar, the chief town of Herzegovina, is on the Narenta, among bare limestone hills.

Montenegro. Montenegro (area about 3,600 square miles) is a barren lofty limestone region, in which cattle-rearing is the chief occupation. The capital is Cetinje, on a plain not far from the sea.

Servia. Servia (area about 19,000 square miles) is a high-land country between the Dinaric Alps and the Balkans, sloping to the lowland of the Morava valley. Swine are fed in immense numbers in the oak and beech forests of the highlands. The valleys are cultivated with cereals and fruits, especially plums. The capital is Belgrad, on hills opposite the confluence of the Save and the Danube. The old Turkish town with its picturesque minarets has been replaced by a modern city.

Bulgaria and Eastern Rumelia. Bulgaria (area about

37,000 square miles) slopes from the Balkans north to the Danube, of which it forms the high right bank. Unlike the low Romanian bank it has good approaches to the river, and many towns along the bank, of which Rustchuk and others are river ports. Varna, on the Black Sea, is also a port. Wheat is grown in the north. Cattle, sheep, and goats are kept in the higher south. The capital is Sofia, on the Isker plain, a city of modern type. Eastern Rumelia lies to the south, forming part of the Maritsa lowland. Roses, cereals, including rice, plums and vines are grown. Raw silk is an



FIG. 88. The situation of Constantinople.

important product. The chief town is Philippopolis, on the Maritsa. (See fig. 88.)

Turkey in Europe. Turkey in Europe (area about 62,000 square miles) includes Albania, a wild land with wilder people, Macedonia, and the lower basins of the rivers flowing to the Aegean. The products resemble those of the surrounding states. The chief inland town is Adrianople, on the Maritsa. Constantinople, the capital, is magnificently situated on the Golden Horn. It is a triple city, consisting of Stambul and Pera on the European, and Scutari on the Asiatic side of the strait. 'Stambul, to the west, projects into the sea of Marmora, a walled and secluded promontory covered with

the domes and shaded with the cypress alleys of the Seraglio, just beyond which rise the roofs of Saint Sophia, once a Christian church, now a mosque. At the eastern side of the Golden Horn is Pera, where the Christians reside. At the southern side of the Bosphorus Scutari juts out, richly decked with mosques and minarets, from the sea at its base to the cypress cemetery with which its upper slopes are darkened.' (See fig. 88.)

Greece. Greece (area about 25,000 square miles) is a mountain-land of islands and peninsulas, with deeply-cut valleys, and isolated plains. The summers are hot and dry, and vegetation becomes parched and withered. The west is wetter and more fertile than the east, producing large quantities of currants. The vine, fig, and olive are grown. The capital is Athens, in a situation resembling that of Edinburgh. It is built round the base of a lofty isolated rock, the summit of which is still crowned by the ruins of ancient temples, commanding the route between the lofty mountains behind and the sea in front.

The climate and products of the islands are similar to those of the mainland.

RUSSIA.

Russia (area about 2,100,000 square miles) occupies the eastern plain of Europe. Look at fig. 54 and notice, too, that almost none of the surface is over 1,000 feet in height, except in the Urals. Trace the line dividing the waters flowing to the Arctic Ocean and the Baltic Sea from those flowing to the Black and Caspian Seas. It runs from the Karpathians to the middle of the Urals. The rivers draining the shorter northern slope flow across the pine-wooded lowlands of Northern Russia, which pass in the extreme north into tundra.

The Dvina Basin. The Northern Dvina, the longest, flows to the White Sea, with the port of Archangel on a low flat, on the right bank of the estuary. This port, which is icebound in winter, is the oldest of the Russian ports, and was long the

only one. The inhabitants of the lower basin of the Dvina, and of the Pechora, to the east, are mainly engaged in preparing train oil from the Arctic fisheries, pitch, tar, and deals from the forests, and in trading in tallow, skins and furs. The peninsula of Russian Lapland, to the north of the White Sea, is thinly populated by fishermen, hunters and reindeer breeders.



FIG. 89. Rivers, Towns, and Routes of Russia in Europe.

The Baltic Lake District. To the south, along the east coast of the Baltic, is the lake region known as Finland, or Fenland, one-third of whose surface consists of water. The rest of the country is covered by pine forests. The capital is Helsingfors, on the Gulf of Finland, the handsome capital of a highly intelligent and progressive country.

Lakes Ladoga and Onega, the largest in this Baltic Lake district, are in Russia, and are drained by the Neva, at the mouth of which stands the capital, St. Petersburg, protected by the island fortress of Kronstadt. Though built on piles in the Neva swamps St. Petersburg is a handsome city, with broad quays, magnificent public buildings and private residences, and the immense cathedral of St. Isaac, with burnished domes and cupolas, brightly coloured as in all Russian churches. The Western Dvina flows across the Baltic Heights to the Gulf of Riga through a land of lakes and pine forests, in the clearings of which rye, flax, and hemp are grown, while the forests supply timber, masts, pitch, and tar for export. The port of Riga, at the mouth of the Dvina, is a picturesque old town, the many spires of which are visible miles out at sea. The upper basin of the Vistula, the lower course of which is in Germany, is in Poland. Timber, flax, rye, and sugar-beet are grown in the forest clearings. The Vistula coal-field supplies the cotton town of Lodz, in a busy industrial region and Warsaw, the capital, on the Vistula, situated on a fertile plain, where routes from all parts meet.

The northern part of the basins of the rivers draining the longer southern slope of the great Russian plain is still in the woodland. Towns are few, and chiefly at the meeting-point of routes. (See fig. 89.)

The Volga Basin. The chief river is the Volga, the longest river in Europe. Its basin forms more than half of Central Russia. Look at fig. 89, trace its course and measure its length. It rises in the low Valdai Hills, about 600 feet above the sea, and its course is everywhere extremely slow. It flows south-east across the woodland. Its tributary, the Oka, which is the longer and larger of the two rivers at their confluence, rises much further south. It flows first north, and then east, draining the coal-field round Tula, the Sheffield of Russia. On a tributary is Moscow, the old capital, in the centre of Russia, on a height in the forest clearing, where

many routes meet. On this height is built the fortress of the Kremlin, a collection of barracks, palaces, and churches, with their innumerable glittering, many coloured domes, forming one of the most picturesque groups of buildings in the world. Nizhni Novgorod, at the confluence of the Oka and Volga, is built partly on the Kremlin Hill, and partly on the plain below, on which a great fair is annually held. The Volga now turns east, flowing between a high right bank, rising in places to 1,000 feet, and a low left bank. A mile or two from the river on the left is Kazan, built round and up the Kremlin Hill, rising above the plain, which is under water when the river is full. A little lower, also on the left bank, is the confluence of the Kama, flowing from the base of the Urals, which are rich in minerals, past Perm, in the centre of a great mining region. Below the confluence the river flows south. Notice in the map the curious bend it makes in passing round a range of hills 1,000 feet in height, with Samara at the end of the bend. This is a busy river port, and an important station where the line running from Moscow east to the Siberian railway crosses the river. Numerous granaries and innumerable windmills show that the river has entered one of the great wheat districts of Southern Russia. Saratov, with numerous bright domes and many windmills, is finely situated on the high right bank of the river, which is here three miles wide. Immense steppes extend on both sides of the river in its lower course, stretching on the east far across Asia. The Volga enters the Caspian by a great delta. Notice that this lake has no outlet to the ocean, but forms what is called a basin of inland drainage. Astrakhan, at the mouth, is built on one of the numerous islands formed by its distributaries. It is the chief port of the Caspian, and a centre of the important sturgeon fisheries of the Lower Volga.

The Don, to the east of the Volga, flows across steppe lands to the Sea of Azov, opening by the Strait of Kertch into the Black Sea, whose waters wash the shores of the Crimean

peninsula. To the east of the river is the Don and Donets coal-field, the busiest town of which is Kharkov, with brewing, engineering and other industries. The longer Dnieper, east of the Don, runs in the forest area, and has a very similar course. It flows past the ancient city of Kiev, built on an amphitheatre of wooded hills on the right bank. Kherson, at the mouth is an important port. Odessa, the principal city of Southern Russia, and the chief centre of the Black Sea trade, is built on a cliff rising above the stormy Black Sea. It trades in all the produce of the steppes.

Climate and Products. The climate of Russia, as we have already seen, is one of extremes, with very severe winters, especially in the north and east. Look back at the map in figs. 57, 58. Little rain falls, and that chiefly in summer. The differences of climate in this vast plain are expressed by well-marked zones. In the north is the bleak tundra, passing to the south into stunted woodlands. These become magnificent forests of evergreens further south, varied by oak and beech towards the centre. About one third of Russia is forest. On the southern edge of the forest the trees appear in clumps, forming an open wooded country. The soil consists of rich black earth, forming some of the finest agricultural land in the world. Farther south are the steppes, or treeless grass-lands, in the better parts of which are grown immense quantities of wheat for export, and of rye for home consumption. To the south the steppes become drier and sandier, with scanty vegetation, where stock can be kept only in the better parts. Along the Caspian and Aral Seas they form sandy wastes, once covered by the waters of these seas. In the Crimea, which is sheltered by hills in the north from the cold winds of the steppe, the climate and products are those of the Mediterranean.

Agriculture, forest industries, and the keeping of animals in the steppes are more important than manufactures. Many factory hands work only in winter, returning to the country in summer. Moscow is the largest manufacturing town, with

cotton as its staple industry. Cotton is also manufactured at Lodz. Rifles, swords, and other weapons, and steel and iron goods of every kind are manufactured on the Tula coal-field. St. Petersburg, like most capitals, has many manufactures. A number of peasant industries are carried on throughout Russia, the best known of which is coloured embroidery.

ASIA

Position. The mainland stretches from the equator to within 12° of the Pole, or including the islands on the continental shelf from 10° S. To the west it is bounded by Europe, the Black Sea, the Mediterranean, and the Red Sea, the latter separating it from the continent of Africa. It stretches east through 154° , to 170° W., where it is less than 40 miles from



FIG. 90. Map of Asia showing Distances from the Coast.

the American coast. Its area is about 17,000,000 square miles, or between four and five times that of Europe.

Seas, Gulfs, Peninsulas, Islands. The greater part of the continent is a compact mass lying between the tropic of Cancer and 70° N. (see figs. 90, 92). Three great peninsulas, Arabia, the Deccan or India, and Indo-China project on the south into the Indian Ocean, and are separated by its gulfs,

the Arabian Sea between Arabia and India, and the Bay of Bengal between India and Indo-China. Notice the almost landlocked Persian Gulf, between the eastern coast of Arabia and the mainland. On the east coast a fringe of islands and peninsulas enclose four seas. These are the South China Sea, enclosed by the East Indian Islands, Sumatra, Java, Borneo and Celebes, and the Sunda, Molucca, and Philippine Islands; the East China Sea, enclosed by Formosa, and the Lu Chu Islands; the Sea of Japan, by the Japanese Islands; and the Sea of Okhotsk, by the Kurile Islands and the Kamchatka peninsula.

Relief. Look at the map in fig. 91 showing the relief. Lines are drawn at 600 feet below sea-level, and at 600 feet, 3,000 feet, and 6,000 feet above sea-level. Notice that about a quarter of Asia is less than 600 feet above sea-level, and that by far the greater part of these lowlands are in the north and west. The highlands form the remainder of the continent, with smaller lowlands round the lower courses of the rivers. About one-twelfth of the continent is over 10,000 feet above sea-level.

We may divide Asia into five belts :

- (1) The Northern Lowland.
- (2) The Central Mountains, with their marginal lowlands.
- (3) The Southern Tablelands.
- (4) The Eastern Highlands.
- (5) The Eastern Volcanic Chain.

The Northern Lowland is continuous with the Great Plain of Europe. The two continents form one vast continent, which is often called Eurasia. The Northern Lowland of Asia and the Plain of Europe form the Eurasian Lowland.

The Northern Lowland is broadest in the west, and narrows towards the east. In the south and east it rises to the Central Mountains and the Eastern Highlands. It consists of the plain of Turan in the south-west, and of the Siberian Lowland in the north.

Turan, the south-west corner of the Northern Lowland, is

drained not to any ocean but to a depression in the centre, the Sea of Aral, a basin of inland drainage like the Caspian. Its rivers are the Amu Daria, or Oxus, and the Syr Daria. To the south and east it is bounded by the lofty walls of the Hindu Kush, the Pamirs, and the Tian-shan, or



FIG. 91. Physical Features of Asia.

Celestial Mountains. In the north-east it is separated by low heights from the Siberian Lowland. Turan consists partly of steppe, and partly of sandy desert, with fertile valleys.

The **Siberian Lowland** consists of three parts. In the west it is a low, flat, swampy plain, drained by the Ob and its tributaries to the Arctic Ocean. The eastern and higher part forms

a low platform drained by the Yenisei and the Lena to the same ocean. East of the Lena are the North-eastern Lowlands, enclosed by the Verkhoyansk and Stanovoi Mountains, which form part of the Eastern Highlands. (See fig. 93.)

The Northern Lowland resembles Russia in its general character. Along the Arctic Ocean extends the tundra, where



FIG. 92. Key to Physical Features shown in Fig. 91.

in spring the rivers melt, and flood the surrounding country, adding to its desolation. South of the tundra are the forests, coniferous in the north, and mixed with deciduous woods in the south. South of the forest zone, or taiga, as it is called in Siberia, are steppe lands, passing into desert in Turan.

The Central Mountains are the largest and loftiest mass of highlands in the world. They are a continuation of the high-

lands of Europe. They widen out from west to east, where they occupy the entire centre of the continent. Three chains or groups, running from west to east, can be distinguished. The northern chain is represented by the Caucasus and the Tian-shan. The central chain, which is the best marked, includes the Pontic Mountains, the Elburz range, the Hindu Kush, the Pamirs, and the Kwenlun Mountains. Between the northern and central chains lie a series of depressions, the Black and Caspian Seas in the west, and the Tarim basin, enclosed between the Tian-shan and the Kwenlun, in the east. The



FIG. 93. The Northern Lowlands of Asia.

southern chain is represented by the Taurus, the Zagros and Sulaiman Mountains, and the mighty Himalayas. Between the central and southern chains lie the plateaus of Asia Minor, Iran, and Tibet. In the Armenian Highlands and the Pamirs these three chains are brought close together, by the narrowing of the mountain belt (fig. 94, and compare with 91).

Most of these mountain systems consist of many ranges, with plateaus and valleys between. The Caucasus resembles parts of the Alps, but with occasional cones of extinct volcanoes, the highest of which, Elbruz, rises to over 18,000 feet.

Its lower slopes are covered with beech forest, with grassy pastures above. The Tian-shan, by no means the longest range in the Central Mountains, extends for a distance as great as that from London to St. Petersburg. Its northern slopes fall steeply to the lowlands of Turan and Western Siberia, its southern slopes equally steeply to the Tarim basin. Many of its peaks are above the snow line, and its glaciers and snow-fields are very extensive. They feed the Amu and Syr Daria, the former rising in the Pamirs. Their upper courses flow first in magnificent gorges and then through



FIG. 94. Physical Features of Northern India and Tibet.

fertile mountain valleys, sinking at last to the plain of Turan, over which they flow with gradually diminishing volume to the Aral Sea. The scenery of the Central Chain is very varied. Its many ranges differ in height, steepness, breadth, and in the rocks of which they are composed. In the Armenian Highlands rise the Euphrates and Tigris, flowing through wild gorges to the lowland of Mesopotamia. The Hindu Kush is a broad and lofty system, which forms the southern wall of the gorge of the upper Amu. The most imposing of all the mountains of Asia are the Himalayas, which rise steeply above the lowlands at their southern base. From the plains

they look like a wall of forest, crowned with peaks of eternal snow. Everything we know of mountain scenery is here seen on a gigantic scale. The forests are more impenetrable, the snow peaks more dazzlingly beautiful, the glaciers vaster, the precipices more stupendous, the gorges sheerer and more profound, the roaring rivers which rush through them, between walls thousands of feet in height, more terrific in strength and volume than anywhere else in the world. By forest, gorge

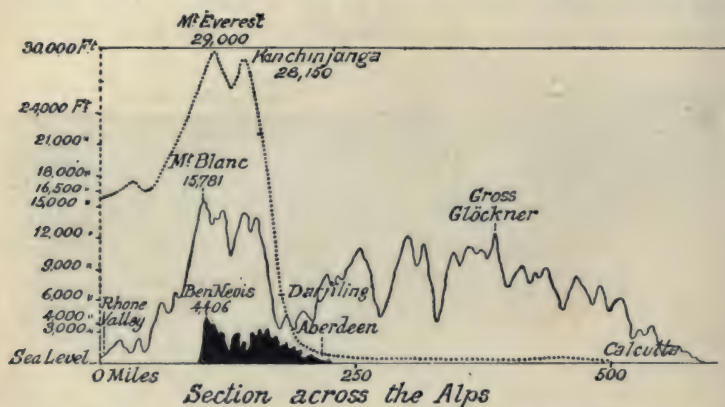


FIG. 95. Comparative Height and Breadth of Himalayas, Alps, and Scottish Highlands.

and precipice, piled like a giant staircase from three to four miles high, they climb to the passes leading to the plateau of Tibet, above which their snowy peaks rise a mile or two higher still (fig. 94). Mount Everest, the highest mountain in the world, is 29,000 feet, or nearly six miles in height (fig. 95). No foot has yet reached it, and the way is barred by peaks almost equally colossal. Three great rivers rise in the glaciers of the Himalayas, all of which break through the mountains in stupendous gorges and defiles, which in places are quite inaccessible. The Indus gathers up the waters of the western Himalayas, and flows south to the Arabian Sea. The Ganges with its many tributaries collects the waters of the Central Himalayas, entering the Bay of Bengal by a vast swampy delta, where it is

joined by the third river, the Brahmaputra, which has found its way over the plateau of Tibet, and round the eastern margin. At the eastern edge of the plateau of Tibet the mountains turn south, and break up into the parallel ranges of Indo-China, separated by densely forested gorges, in which the rivers Irawadi, Salwin, Mekong and others flow south to the sea. The glaciers of Eastern Tibet give birth to the Hwang-ho and the Yang-tse-kiang. Their upper courses are



FIG. 96. Caravan Routes from Oasis to Oasis in Arabia.

in wild and little-known gorges, their middle courses cross the Eastern Highlands, and their lower courses form the fertile lowlands of China.

The plateaus of Asia Minor, Iran and Tibet, are all rugged lands, above whose surface rise many mountains. The valleys, though often steep are fertile, especially in Asia Minor, and Iran. Even in Tibet, which lies nearly three miles above the level of the sea, there are a few valleys where agriculture

is possible. Much of the area of all these plateaus, however, is fit only for poor pasture.

South of the Central Mountains are the marginal lowlands, varying from a mere strip along the coast, as in Asia Minor and Iran, to broad and fertile plains round the lower courses of the rivers. Look at fig. 92 and find the plain of Mesopotamia, consisting of the lower basins of the Euphrates and Tigris,



FIG. 97. Physical Features of India.

flowing to the Persian Gulf; the plain of Hindustan, formed by the lower basins of the Indus and the Ganges, walled in by the Sulaiman, Hindu Kush and Himalaya Mountains; the plain of Burma round the lower Irawadi; the plain of Siam round the lower Menam; and the plain of Cambodia round the lower Mekong. These lowlands are extraordinarily fertile. In the plains of Mesopotamia and Hindustan irrigation is

necessary, but the rivers supply abundant water for this purpose.

South of these lowlands lie the Southern Tablelands, Arabia and the Deccan.

Arabia is separated from Africa by the rift of the Red Sea, at the head of which is the narrow isthmus of Suez, connecting



FIG. 98. Rivers and Canals of India.

the two continents. It is a tableland, highest in the west and sloping eastwards to the Persian Gulf. The western part is covered with poor pasture, broken up by deep, steep, fertile valleys. Further east are sandy deserts, with isolated fertile spots known as oases (fig. 96). A narrow strip of sandy infertile lowland borders the tableland, widening in the east to the Mesopotamian plain.

The tableland of the Deccan lies south of the plain of Hindustan. It also is highest in the west, where its margin, rising steeply above the narrow coastal lowland, is known as the Western Ghats, or Steps (fig. 97). Its southern end forms the Nilgiri Hills. It slopes to the east, and most of its rivers, such as the Godavari and Krishna, flow in that direction to the Bay of Bengal, except the Narbada and Tapti, in the

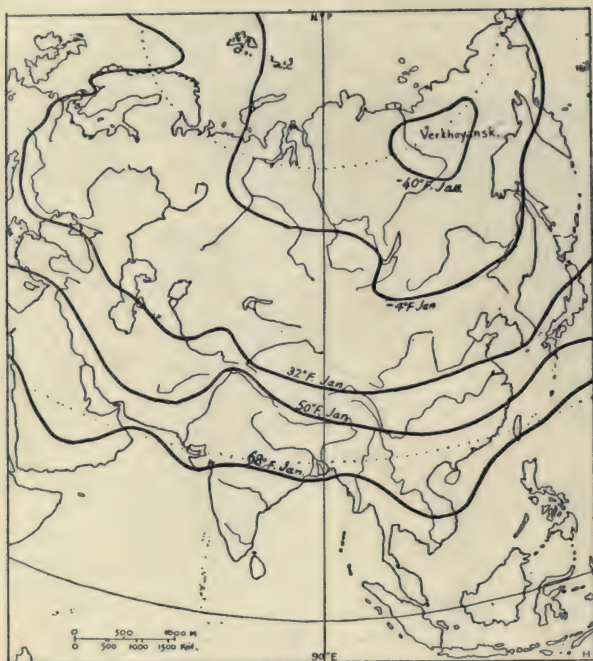


FIG. 99. Mean Temperature in January reduced to sea-level.

north-west, which flow west (figs. 97 and 98). To the south, separated by the shallow Palk Strait, is the island of Ceylon, low in the north, but mountainous in the south.

The **Eastern Highlands** are much older and less lofty than the Central Mountains, to which they bear the same relation as the Central European Highlands bear to the Alps. The long narrow Lake Baikal separates the Sayan and Altai

mountains to the west, from the Yablonoi, or Trans-Baikal Highlands to the east. To the south is the Mongolian plateau, composed of deserts and poor steppes, stretching to the base of the Central Mountains. The eastern edge of this plateau forms the Khingan Mountains, overlooking the lowland of Manchuria drained by the Amur, and the North China Highlands, overlooking the plain of North China. To



FIG. 100. Mean Temperature in July reduced to sea-level.

the south of this plain are the extensive South China Highlands, between Tibet and the Sea.

The **Eastern Volcanic Chain** runs through Kamchatka, the Kurile Islands, Japan, the Lu-chu Islands and the Philippines. It is characterized by fertile soil, deep valleys and steep conical mountains, of which Fujiyama, the sacred mountain of Japan, is the most perfect.

Climate. Two circumstances combine to make the climate of Asia very varied. The first is its great extension from north to south, the extreme north being within the Arctic Circle, the extreme south quite near the equator. The second



FIG. 101. Mean Annual Rainfall of Asia.

is its great difference of elevation, which varies from sea-level to the summit of Mount Everest, nearly six miles higher.

Over most of Asia the climate is marked by great extremes. We saw in Europe the influence of the ocean in rendering climate equable. In Asia the land mass is much

more compact. Look at the diagram in fig. 90. It shows a circle whose centre is the west of the Mongolian plateau, and whose radius is 2,000 miles in length. Notice that this circle includes almost no sea. The same diagram shows how

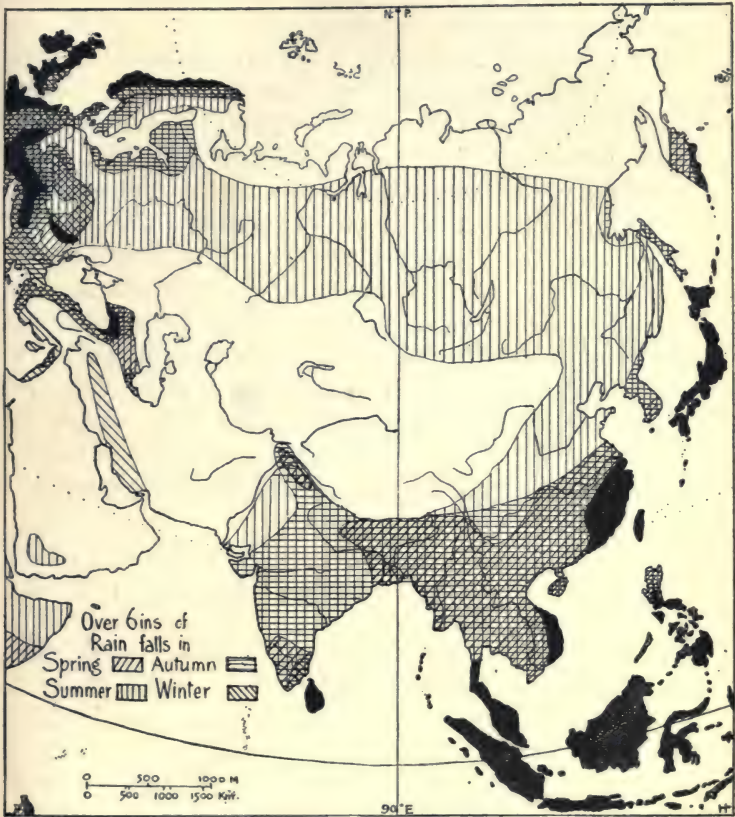


FIG. 102. Seasonal Distribution of Rainfall in Asia.

great a proportion of the continent is over 500 miles from the sea, while the interior is over 1,500 miles from it. A very small proportion of the continent, therefore, is rendered equable by the neighbourhood of the sea.

Look at the map in fig. 99 and notice how large an area of

the land is under the freezing point in January, and how only the south, and south-east are free from frost. Notice on the other hand in the map in fig. 100 that in July the greater part of the lowlands in the interior are at least as warm as the Mediterranean, and that only the extreme north and the high mountain areas have low temperatures.

Now look at the rainfall map in fig. 101. Notice that only the margin of the continent from Kamchatka to the Deccan and a narrow strip round the Mediterranean has over 20 inches rainfall. Two-thirds of the continent receives very little rain. In winter the winds blow out from the land to the ocean, so that little rain falls at that season except round the Mediterranean, and on the north-east coast, north of Korea, where winter storms occur. In summer, except in the Mediterranean, the winds blow in from the sea, bringing rain from the ocean, so that summer is the wetter season. As the seas lie to the south and east most of their moisture is intercepted by the lofty mountains of these regions and very little reaches the interior. Only in the northern lowlands, where there are no high mountains, is there a belt of rainfall across the interior of the continent.

The winds of the Indian Ocean are called Monsoons. They blow outward from the north-east in winter, which is the dry season, and inwards, from the south-west, in summer, which is the wet season. The same name is often given to the out-flowing and inflowing winds of eastern Asia (see fig. 111).

Natural Regions of Asia. We may group the lands of Asia, according to their climate, vegetation, and products, as the Mediterranean lands, the Siberian lands, the Desert lands, and the Monsoon lands. The political divisions are shown in fig. 103.

The Mediterranean Lands. These stretch from the Mediterranean to the plateau of Iran. Politically they include Asia Minor, Syria, Palestine, Armenia, and Mesopotamia, belonging to the Turkish Empire, the Russian province of Transcaucasia, and the kingdom of Persia. All have the Mediterranean

climate with warm, dry summers, mild winters and winter rains, but the heat increases rapidly to the south and away from the sea, and the rainfall diminishes (see figs. 104, 105). It is therefore difficult to draw the line between the Mediterranean and the desert lands. The products belong to the Mediterranean



FIG. 103. Political Divisions of Asia. The British possessions are shaded.

type. The cereals include barley, wheat, maize, and millets. The vine is extensively grown round the Mediterranean for raisins, but inland becomes less important than the fig, pomegranate, peach, and apricot. The mulberry is extensively cultivated as a shade tree and for silk-worms, and cotton, tobacco, and the opium poppy are largely grown. The date-

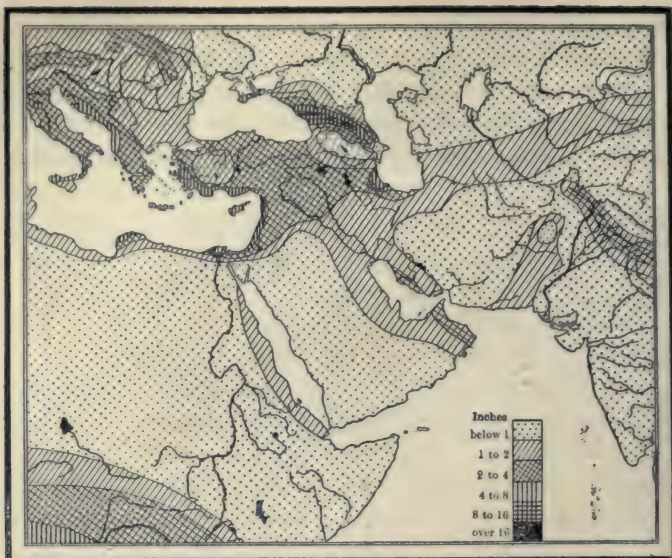


FIG. 104. Rainfall in January.

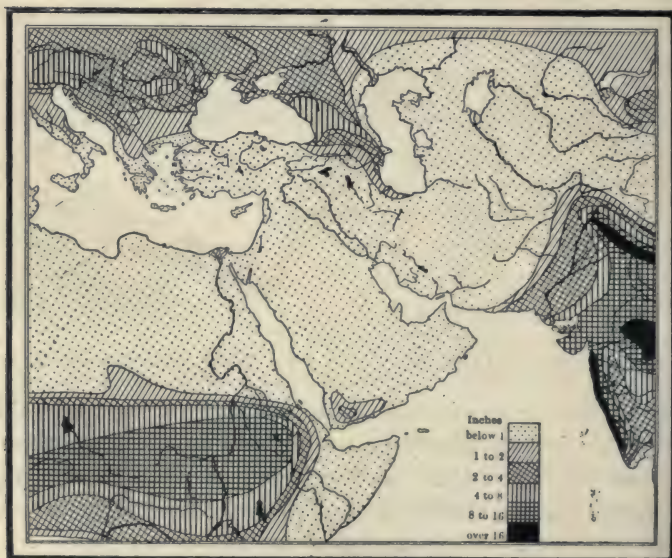


FIG. 105. Rainfall in July.

palm becomes important towards the desert edge. Irrigation is necessary everywhere. Camels, goats, and sheep are kept on the plateaus and in the highlands, and the manufacture of rugs and carpets is a flourishing industry (see figs. 106, 107).

Caucasia. The Russian province of Caucasia (area about 181,000 square miles) is the best developed of these lands. It includes the magnificent forested slopes of the Caucasus,



FIG. 106. Some of the more important Foods of SW. Asia:

the valleys with their vineyards, orchards, and fields of maize, cotton, and tobacco, the minerals of the Caucasus, and in particular the inexhaustible deposits of petroleum around the Caspian. The centre of the petroleum region is Baku, on the Caspian. Its busiest suburb is expressively called Black Town. The capital of the province is Tiflis, on the precipitous cliffs of the Kur river. A railway connects Baku with Batum

on the Black Sea, through the magnificent forested gorge of the Rion, with the lowlands cleared for maize. At every station are long sidings filled with trucks of oil tanks, so important is this industry to the province.

The Turkish Provinces. The Turkish provinces (area about 650,000 square miles) present a striking contrast with



FIG. 107. Some Products of SW. Asia.

Caucasia in the neglect of their natural riches. Irrigation is backward, and tracts which might produce rich crops are allowed to serve for poor pasture. Railways are little developed, and much of the trade is done by camel caravan. On the Black Sea the chief port is Trebizond. To the south are the highlands of Armenia and Kurdistan, with Erzerum as the largest town. Smyrna, on the Aegean, exports fruits,

cotton, opium, figs, carpets, sponges, &c. Syria, to the south, with Palestine, and its capital Jerusalem, are poorly cultivated and thinly peopled. The oranges of Jaffa are celebrated, and tobacco and silk are important. The capital is Damascus, an important centre of caravan trade, connected by rail, across



FIG. 108. Towns, Routes, and Political Divisions of SW. Asia.

the Lebanon range, with Beirut, on the Mediterranean. Aleppo, farther north, is a great meeting-place of routes, on the shortest route from the Mediterranean to Mesopotamia, once the granary of Asia, which has fallen into decay through the ruin of its irrigation system. Wandering tribes of herdsmen and robbers form the scanty population of what should

be a garden. The dates of the lower Tigris and the Persian Gulf are exported from Basra. The chief towns are Mosul and Baghdad, both on the Tigris, which is navigable for river steamers to the latter town (see fig. 108).

Persia. Persia (area about 630,000 sq. miles) resembles the Turkish provinces, but a greater proportion of the surface is salt or sand desert. The villages are chiefly in the mountain valleys, and the arid plains are thinly peopled. Water is brought for many miles in underground channels and wherever it comes it brings fertility. Communication is by mule or camel caravan, while Persian horses are famous. Roads are bad, and railways few. The capital is Teheran, at the foot of the Elburz mountains. The other towns are Tabriz and Resht, in the north-west, Ispahan and Shiraz, in the centre, and Bushire on the Persian Gulf (see fig. 108).

Cyprus, in the Mediterranean, resembling Asia Minor in climate and products, is administered by Britain.

The Siberian Lands. The Siberian lands (area nearly 5,000,000 sq. miles), the great northern lowland of Asia, form part of the Russian Empire. Siberia has all the varieties of climate of Eastern Europe, but in a more extreme form, and with less rainfall, owing to its greater distance from the sea. It is in fact an extension of Eastern Europe, the Urals forming no true boundary. Its tundra, forests, or taiga, steppes, and deserts are a continuation of the same zones in Russia.

The resources of Siberia, though far from fully developed, are very great. Its forests supply all kinds of forest produce, and form the greatest fur preserve in the world. In the Urals and the Eastern Highlands the mineral wealth is great. In the lands south of the forest enormous harvests of wheat are grown in the rich black earth. In the steppes flocks and herds support a nomadic population, and supply sheepskin and felt, from the sheep, leather and saddlery, from oxen and horses, camels' hair cloth, rugs, carpets, tallow, &c. The margin of the desert of Turan (area about 1,500,000 sq. miles)

is being brought under cultivation, and in the oases of Khiva, Merv, Bokhara, Samarkand, Tashkent, Khojent, and Khokand, cotton and the fruits and cereals of hot countries ripen.

The chief towns of Siberia are Omsk, and Tomsk on tributaries of the Ob, and Irkutsk near Lake Baikal. These are towns which combine streets impassable from mud, with the fine buildings, and the luxuries and conveniences of European cities. A transcontinental railway, the Great Siberian line, runs from Europe and Russia across the steppes to Omsk, the 'capital of the steppes,' and thence through the forest past

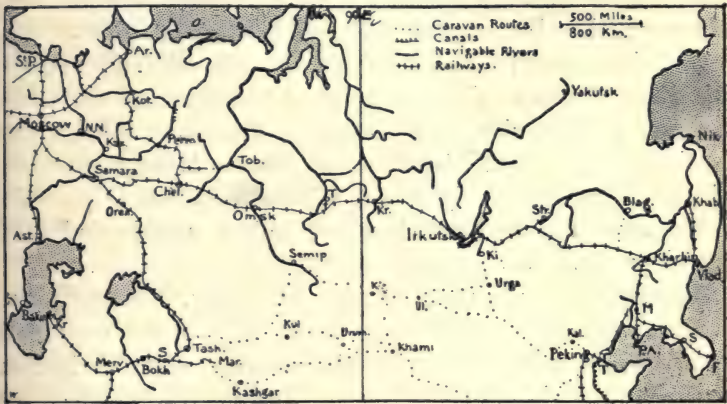


FIG. 109. Towns and Routes of Russian Asia.

Krasnoyarsk, on the Yenisei, to Irkutsk, the chief town of Siberia. The line runs south of the lake, then crosses the highlands to the east, sending a branch to Stretensk, for the navigation of the Amur, the chief river ports of which are Blagovestschenk and Khabarovsk. The main line continues across Manchuria to the Pacific, which is reached at Vladivostok, on the sea of Japan, while a southern branch passes by Mukden to Port Arthur (see fig. 109).

The towns of Turan, situated on the oases of the same name already mentioned, are connected by the Trans-Caspian line, which runs to Khokand, at the foot of the Tian-shan.

From Khojent it connects through Tashkent with Orenburg, and the European lines (see fig. 109).

The Desert Lands. The desert lands are of two kinds, the cold and the hot. The cold deserts lie either in the far north, in the Siberian tundra, or at great elevations, as in Tibet (area about 738,000 sq. miles) which forms part of the Chinese empire (fig. 94). The greater part of this plateau consists of snow-fields and tundra-like wastes, but in a few sheltered valleys barley and fruits ripen in the hot summer. The chief occupation outside these valleys is the keeping of yaks, a kind of ox, which can cross passes too high for any other animals. The capital is Lhasa, in a fertile valley.

The hot deserts stretch from Arabia, through Persia (including Turan to the north, and Afghanistan to the east), the Tarim depression, and Mongolia, almost to the Pacific. In the deserts of the interior the climate is very extreme, winters being extremely cold. Where irrigation is possible fertile oases can be created, where cotton, cereals and fruit can be grown.

Arabia (area about 1,400,000 sq. miles. Independent Arabia, 1,230,000 sq. miles) is fertile only in the west and south, where perennial mountain streams make irrigation possible. This richer part belongs to Turkey. Coffee and dates are the most valuable agricultural products, and the horse and camel the most valuable animals. Mecca, Medina, and the port of Mocha at the south of the Red Sea are almost the only towns. Aden, a barren volcanic peninsula at the southern entrance to the Red Sea, is a British coaling station, and a key to the route to India. The remainder of Arabia is divided among petty sovereigns. In the south-west is the port of Muscat (see figs. 96, 108).

Afghanistan. Afghanistan (area about 250,000 sq. miles) is a land of bleak mountains and deep valleys, with a very extreme climate. The valleys permit a scanty agriculture, when irrigated. Elsewhere a poor pasture affords grazing for animals. The camel is the principal transport animal.

The chief towns are Herat, in a fertile valley, and Kabul, which commands the route into India by the Khaibar Pass.

Chinese Turkestan. The deserts of the Tarim, or Chinese Turkestan, and Mongolia, form part of the Chinese Empire. They are walled in by mountains, at the base of which are oases. The rest is poor steppe or sandy desert. In the west Kashgar and Yarkand are important towns. In the east the oases are small and the towns unimportant.

The Monsoon Lands. These have dry winters (very cold in the north, warm in the south), and hot summers with a well-marked rainy season. Irrigation is carried to great perfection in India and China, enabling arid regions to be cultivated and both winter and summer crops to be raised. Rice, grown in flooded fields, is a very important crop, forming along with millet the staple food of the people. Maize, wheat, and other cereals, pulses, oil-seeds, sugar, and the opium poppy are largely cultivated. Tea, which needs hot summers, abundant showers, and good drainage, is grown on the hill slopes of Japan, China, India and Ceylon, and Java. Of fibre-yielding plants the most important are cotton, which is grown throughout the monsoon lands, and jute, cultivated in the Ganges delta. The forests, which cover large areas, especially in Indo-China, provide hard timbers, teak being the most valuable, fancy woods such as ebony, lacquer, and wax trees, and other valuable products. In the lowlands of the Ganges delta, and of Indo-China, in parts of which the rainfall is enormous, the forests become dense and rank, forming wet jungles, which supply rubber, cacao, and other tropical plants. In these forests live the tiger, elephant, huge apes, and other animals, never seen in the forests of the north. The buffalo becomes an important draught animal, especially in India.

In the south are (1) the Indian Empire, including the plain of Hindustan, the Deccan peninsula with Ceylon, and the western part of the Indo-Chinese peninsula, (2) the independent kingdom of Siam, (3) French Indo-China, occupying

most of the peninsula east of Siam, (4) the Malay archipelago. In the east are the Chinese Empire, excluding Tibet and Mongolia, the small kingdom of Korea, occupying the peninsula of that name, and the island empire of Japan (see fig. 103).

India. India, or Hindustan (area about 1,500,000 sq. miles) presents great varieties of surface and climate (fig. 97). In the north it occupies the slopes of the Himalayas, in which the chief state is Kashmir, with its capital, Srinagar, situated on a beautiful lake, surrounded with snow peaks. The lower slopes of the Himalayas are densely forested, and at their base is a strip of unhealthy jungle, known as the Terai. In the east tea is largely grown on the hills of Assam, in the forest

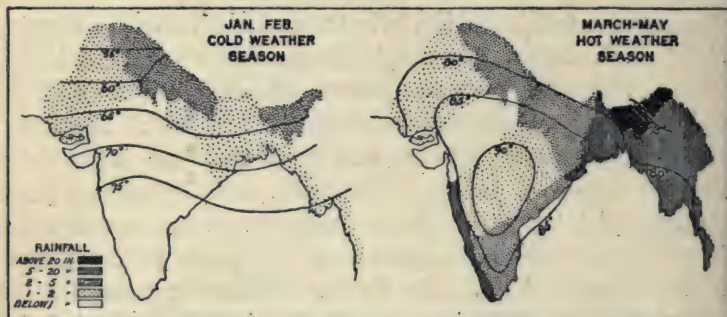


FIG. 110. Climate of India in the first five months of the year.

clearings. The mountains of the north-west frontier are much bleaker, and share the arid nature of the surrounding countries. From the Himalayas the rivers descend in gorges of the wildest character to the plains below, where their waters are gathered up by the Indus and its great tributary the Sutlej in the west, and by the Ganges and its tributaries in the east. The east and west of the plain of Hindustan differ considerably in climate. The south-west monsoon brings abundant rains to most of the Ganges basin, though it is occasionally late, or scanty. When this occurs over a series of years scarcity or actual famine results. In the west the rainfall is much less copious, and south of the

Indus desert conditions are found in the desert of Rajputana (figs. 110, 111). Irrigation is necessary throughout the plain, in the west because of the scanty rainfall, in the east rather

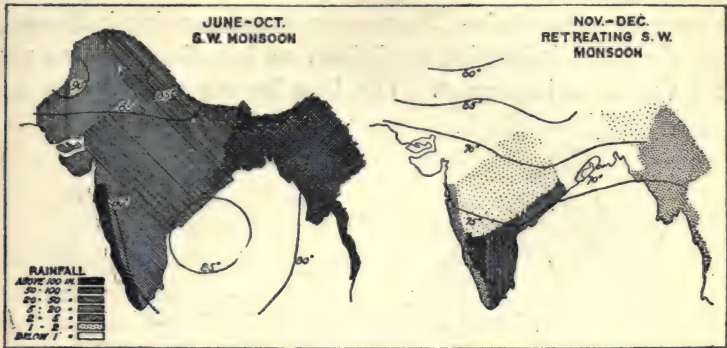


FIG. 111. Climate of India in the last seven months of the year.

because of its uncertainty. With its aid both winter and summer crops can be grown. Immense sums of money have been spent in constructing irrigation canals which distribute



FIG. 112. Distribution of Wheat in India.

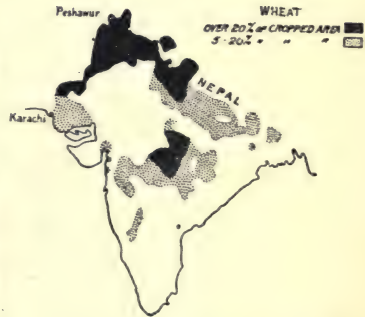


FIG. 113. Distribution of Rice in India.

the waters of the rivers over the plain. Nearly three-quarters of the population are engaged in agriculture. Wheat is grown in the cooler north as a winter crop (fig. 112). Millets, pulses, and oil seeds, of which linseed is perhaps the most important,

are universally cultivated. The opium poppy is grown in the Ganges valley, and jute in the delta. Rice is grown in Bengal, and yields two crops a year (fig. 113). Indigo is grown round the Ganges and in the Punjab, or district round the five chief tributaries of the Indus. Manufactures are growing in Bengal, but the hand industries, carried on as hereditary trades, are still the most important. The best known of these are the



FIG. 114. Railways of India.

fine carpets, muslins and silks, for which India has long been noted.

The most famous cities of India lie on the Ganges and its tributaries, a proof that this has always been the richest part of the country, and the most frequented route across it. Delhi, Agra, Lucknow, Allahabad, Benares, all contain magnificent buildings of great splendour and antiquity. The

position of Calcutta, the capital, on the Hugli distributary of the Ganges, makes it the outlet for one of the richest and most densely peopled regions in the world (see fig. 116). The Indus, which flows through a more arid country, has hardly any cities of note, except Karachi, the port which exports the wheat of the north-west, and Lahore and Multan in the Punjab. A network of railways covers the plain of Hindustan, the chief running from Calcutta north-west to Peshawar, at the mouth of the Khaibar route from Afghanistan (see fig. 114).

The tableland of the Deccan has hotter winters than the north, and a more uncertain rainfall, particularly in the centre, where the failure of the monsoon means certain famine. The Deccan is the great cotton growing area of India, and the cotton manufacture is very important in Bombay on the coastal plain of the west (fig. 115). Millets and pulses are staple crops. Few railways cross the tableland, and the rivers

are difficult of navigation. For all these reasons it is less densely populated than the plains to the north. The chief towns are Bombay, on the west coast, Madras on the east, the capitals of presidencies of the same name, Haidarabad, in the centre of the tableland, the capital of the native state of Haidarabad, and Poona, on the edge of the tableland, above Bombay.

The most densely peopled parts of India are the coastal plains and the Ganges basin (see fig. 116). The political divisions are shown in fig. 117, and the states under native rulers in fig. 118.

Burma. Burma (area about 168,000 sq. miles) is politically



FIG. 115. Distribution of Cotton in India.

part of India. It is a land of forests and jungles, which yield valuable timbers, especially teak. Rice is largely grown in the lowlands. Its mineral wealth consists of coal and petroleum. The capital is Rangoon, on the Irawadi. Moulmein, at the mouth of the Salwin, is the other chief port. Mandalay, on the Irawadi, is the most important inland town.

Ceylon. Ceylon (area about 25,000 square miles), to the south of India, is flat in the north and mountainous in the

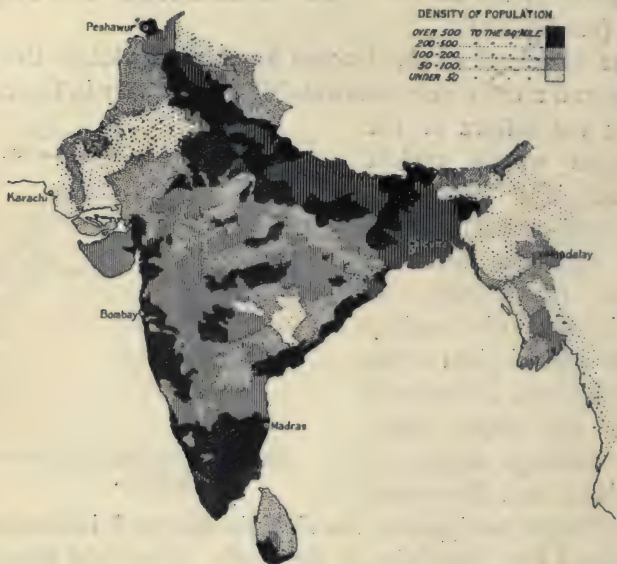


FIG. 116. Density of Population in India and Ceylon.

south. Coco-nuts, rice, tea, coffee, and cinchona are important products. The chief towns are Colombo, on the east coast, and Kandy in the interior.

Indo-China. Indo-China is a land of forested mountains and swampy lowlands. Rice is the chief crop. Indigo is becoming important in French Indo-China. The products of the luxuriant tropical forests include gutta-percha, rubber, cacao, pepper, &c. Bangkok is the capital of the kingdom of Siam (area about

200,000 sq. miles)(see fig. 119). The chief towns of French Indo-China (area about 257,000 sq. miles) are Saigon in the south, Hue, in the centre, and Hanoi in the north. The long narrow mountainous densely-forested south-western peninsula forms the Malay peninsula, the southern part of which is British. Its tin mines are the richest in the world. To the south is



FIG. 117. Political Divisions of India and Surrounding Lands.

the island of Singapore, also British, one of the great shipping and trading centres of the east.

The Malay Archipelago. In the Malay archipelago Sumatra, Java, and the smaller Sunda Islands continue the line of the Malay peninsula. To the north lie Borneo and Celebes, and the Moluccas, or Spice Islands, with the Philippine archipelago, east of the South China Sea. The latter belongs to the United States. The rest of the islands form the Dutch East

Indies, except the northern part of Borneo, which is British. Java is by far the most important of these islands. A chain of volcanoes runs through it, and the lower slopes, with the plains at their base, are extraordinarily fertile and well cultivated. Coffee and sugar are the most important products, but tea, indigo, cacao, tobacco, spices, rice, and cinchona are also largely grown. The chief town is Batavia. The other Dutch islands have similar products, the Moluccas being specially noted for their cloves and other spices. Luzon, the largest of the Philippines, is next to Java in importance. It produces tobacco, sugar, and a strong fibre, known as Manila

hemp, so called from Manila, the capital and chief port of the archipelago.

China. The monsoon lands of China are the lowland of Manchuria, the northern plain, and the southern highlands. The winters are cold, even in the south, the rainfall generally abundant, and occurring in the summer.

Manchuria is extremely fertile, but still thinly



FIG. 118. Parts of India governed by Native Rulers.

peopled, though towns are growing rapidly at points along the railway. Beans, millets, cereals, fruits and medicinal plants, such as ginseng, are grown. The capital is Mukden, in the south, with the port of Niuchwang. Port Arthur, with the port of Dalnyi, is the terminus of the Siberian line (see fig. 109).

The Northern Plain of China is covered with a rich but thirsty yellow soil, which makes irrigation necessary even where the rainfall would be ample for less porous soils. Millets and cereals are the chief crops. The mineral wealth,

particularly coal, is enormous, in the bordering hills, and as it occurs near densely populated parts of the empire, manufactures will develop rapidly in the near future (figs. 120, 121).



FIG. 119. The Far East.

The Hwangho, the chief river of Northern China, is not navigable, and has an uncertain course through the loose soil. Its banks are higher than the surrounding plain, and it frequently breaks through the embankments which restrain it, flooding vast areas, and destroying thousands of lives.

The capital is Peking, in the north, with Tientsin as its port.

Southern China is more varied in surface than North China. Much of it consists of a fertile red soil, which can be cultivated to a great height in the mountain valleys. The largest river is the Yangtse-kiang, which flows through one of the richest regions of China. Tea is grown on the hill slopes,



FIG. 120. Coal and Iron in China.

and opium, cereals, silk, tobacco, coal, salt, and iron are the other chief products. Many populous towns, such as Hankow, lie on the Yangtse, which is navigable for ocean steamers to the Ichang gorge, 1,000 miles from the sea. Shanghai, near its mouth, is one of the busiest ports in the East. The basin of the Si-kiang to the south, is hotter and wetter, and rice is largely grown in the lowlands. The mulberry is important

in the highlands, and silk is a valuable product. Minerals are abundant in the basins of both the Si and the Yangtse. Canton, at the mouth of the Si, is the chief among the many ports which export the produce of this rich region. Hong-kong, an island at the mouth of the Si, is British.

The chief railways of China are shown in fig. 122.

Tibet and Mongolia, which are included in the Chinese



FIG. 121. Population of Eastern Asia.

Empire (area about 4,278,000 sq. miles), have already been described.

Korea. Korea (area about 82,000 sq. miles) is a mountainous peninsula, sloping steeply to the ocean, and covered with forest. Its resources are very undeveloped, but its mineral wealth is known to be great. The valleys and plains of the longer western slope are planted with rice and maize in the south, and with temperate cereals and pulses in the north.

The capital is Seoul, some distance from the sea, with Chemulpho as its port.

Japan. Japan (area about 148,000 sq. miles) consists of four large volcanic islands and several small ones (see fig. 123). The northern island of Yezo is a hilly forested land, with coal and other minerals, and rich fisheries. The capital is Hakodate. Honshiu, the most important island, contains several active and some extinct volcanoes, including the beautiful Fujiyama, represented in almost every Japanese picture. The forests



FIG. 122. Chief Railways of China.

produce valuable timber, including the lacquer tree. On the lower slopes are cultivated tea and mulberries. The valleys and flooded plains are planted with rice and other cereals, pulses, and fruit trees. The capital is Tokyo, on the bay of the same name, with Yokohama as its port, the centre of a great foreign trade. The old capital is Kyoto, to the west, on Lake Biwa. Not far away, on the shores of the beautiful island-studded Inland Sea, is Osaka, a city of canals and factory chimneys, engaged in ship-building and cotton manufacturing. Kobe is the chief port of this important

industrial region. To the south of the Inland Sea are the islands of Shikoku and Kiushiu, the latter with a rich coal-field near Nagasaki, its chief town and port, on a magnificent harbour. Formosa (area about 14,000 sq. miles), off the coast of China, nearly a thousand miles to the south, is a forested mountain land, producing camphor in the highlands, and tea on the lower hills.

Peoples of Asia. The races of Asia are very varied. They were formerly classed as (1) the Caucasian or White Race, inhabiting Asia Minor, Arabia, Persia, Afghanistan, and the northern part of India, (2) the Malay, or Brown Race, occupying much of Indo-China, and the Malay archipelago, (3) the Mongolian, or Yellow Race, occupying the remaining and far greater part of the continent. If this classification is limited to the languages spoken, it is no doubt nearly correct. The peoples are at every stage of culture, from the highly civilized races of India, China and Japan, to the wild tribes inhabiting the forests of the south-eastern peninsulas and islands. Many religions are professed, the most important being Mohammedanism, which extends eastward from the Mediterranean into India, China, and the Malay peninsula and archipelago, and Buddhism, which extends north and east from India into Tibet, Siberia, China, and Japan. Hinduism

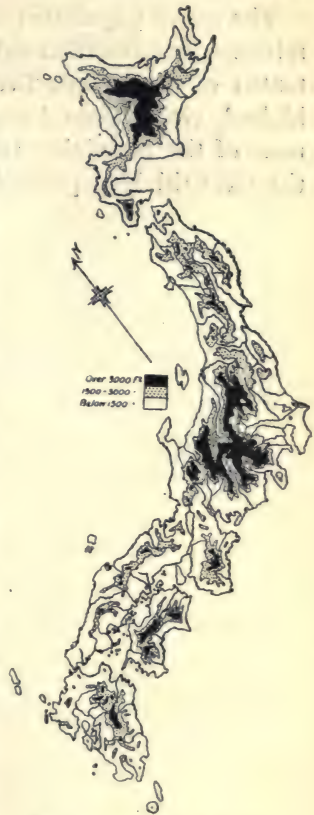


FIG. 123. Physical Features of Japan.

is peculiar to India, Confucianism to China, and Shintoism to Japan, existing side by side with the other religions named. Christianity is the religion of the white conquerors. Various forms of heathenism are practised by the uncivilized tribes of the forest and tundra.

The entire population of Asia is supposed to be about 850 millions, or more than half of the human race. Nearly nine-tenths of the people live in the monsoon lands where the highest civilizations have developed. The steppes contain most of the remaining tenth. The hot and cold deserts are the most thinly populated part of the continent.

narrow isthmus of Suez. On the north it is bounded by the Mediterranean, on the west and south by the Atlantic, on the east by the Indian Ocean and the narrow rift of the Red Sea, separating it from Asia. Relatively to the size of Asia the Mediterranean, which narrows to a few miles in width at the Strait of Gibraltar, and the Red Sea are of trifling size, and exert little influence on the climate of the continent.

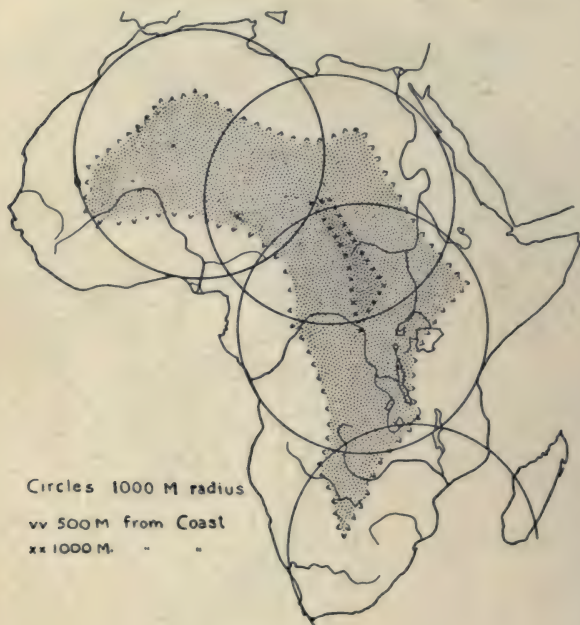


FIG. 125. Map of Africa showing Distances from the Sea.

Notice the extreme compactness of Africa, and the absence of peninsulas and islands, except Madagascar, off the east coast, separated by the Mozambique Channel. In the north there is a single great gulf, the Gulf of Tripoli. On the west, about 4° N., the continent narrows to half its width, forming the Gulf of Guinea. Africa, therefore, is the most compact

of the three continents which form the great island of the Old World (see fig. 125).

Relief. Look at fig. 126 showing the relief of Africa, on which are drawn lines at 600 feet below sea-level, and at



FIG. 126. Relief Map of Africa.

600, 1,500, 3,000, and 6,000 feet above. Notice the uniformity of Africa, compared with the other continents. The continent is a tableland or series of tablelands, lower in the north and west, higher in the south and east. Except in the north-west, where the Atlas Mountains rise to the height of over

6,000 feet, there is little land over 3,000 feet in north and west. In the south and east, on the contrary, except for the narrow coastal plain, and along the courses of the rivers, there is little land lower than 3,000 feet. Notice that the highlands everywhere come close to the sea, forming a more or less steep escarpment, and leaving only a narrow coastal plain at the base. The rivers, therefore, all form falls or rapids, where they descend from the plateau to the plain below.

Natural Regions. Africa consists of several well marked regions :—

(1) The high north-west margin, forming the Atlas Mountains.



FIG. 127. Mean Temperature in January reduced to sea-level.

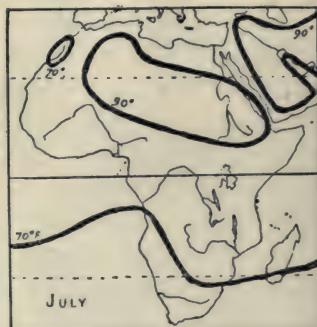


FIG. 128. Mean Temperature in July reduced to sea-level.

(2) The Sahara, or rainless desert, mostly below 1,500 feet in height but with isolated masses of higher ground rising to over 3,000 feet.

- (3) The Niger basin and upper Guinea.
- (4) The Nile basin.
- (5) The Congo basin.
- (6) The Abyssinian Highlands in the north-east.
- (7) The Plateau of the Great Lakes.
- (8) The Southern Plateau, drained by the Zambezi and other rivers.

Climate. Look at the map of African temperatures (figs.

127, 128). Notice that three-quarters of the continent lies between the tropics. The temperature is, therefore, everywhere high. Only in the extreme north and south and in the highest parts is the average temperature under 60° in the coldest month. The high edges of the plateau intercept the winds from the ocean, allowing only a narrow strip of coast to feel its equalizing influence. There is little to temper the heat of the interior, especially north of the equator, where the continent is broadest.

Notice that the summer and winter temperatures are not very different in the equatorial regions. To explain this look at the rainfall map. This shows a broad belt of heavy rains at all seasons around the equator. There is generally a screen of cloud between the surface of the earth and the direct rays of the sun. Thus there is no very marked difference between the temperature of day and night, or of winter and summer. Notice that the summers are not so hot as in the rainless regions to the north and south, where there is no such screen of cloud, and where the direct rays of the sun beat down upon the soil which has no covering of vegetation to protect it. In the desert the difference of temperature between day and night and between winter and summer is very marked. The extreme north and south of Africa have winter and summer temperatures corresponding to those of the Mediterranean at the same elevation.

The equator bisects the continent, so that allowing for the difference in the breadth and height of the land there is great similarity in the zones of climate and vegetation north and south of the equator. On either side of the equatorial belt, where heavy rains fall at all seasons, is a belt in which fairly abundant rains fall in summer (see fig. 129). Do not forget that south of the equator summer occurs during the northern winter. North and south of these belts of summer rains are the rainless deserts, covering the whole of the continent in the north, where it is broadest, but much narrower in the south, where it tapers. On the north-western margin of the

northern, or Saharan desert, the Atlas region has winter rains, that is, the Mediterranean climate, already explained. A similar climate is found in the extreme south-west corner of South Africa, for similar reasons. The south-east of South Africa and Madagascar are included in the region of



FIG. 129. Rainy Seasons in Africa.

summer rains (see fig. 129). The total annual rainfall is shown in fig. 130.

The cause of these differences in the season at which rain falls depends largely on the heating and cooling of the air over sea and land. Where the sun is highest, and the air most heated, a belt of air is always rising, and

passing into higher and colder layers of the atmosphere, where it parts with some of its moisture as rain. This belt moves north and south of the equator with the sun, but the equator is always within it. This explains why there is rain at the equator at all seasons of the year, and why the

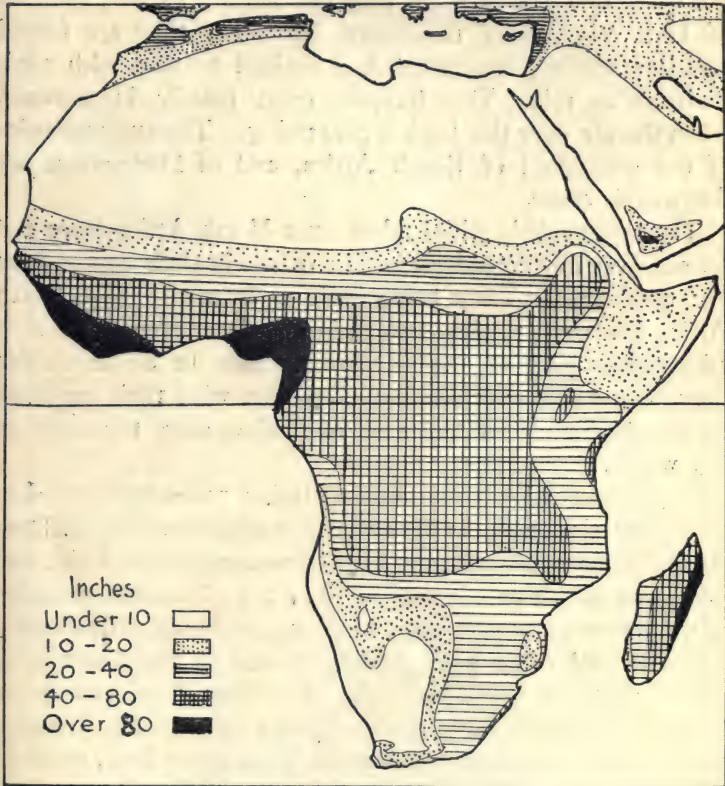


FIG. 130. Mean Annual Rainfall of Africa.

regions to the north and south have rain in summer when the sun is highest.

This rising of air in the equatorial belt explains the permanent winds known as trade winds. They are caused by the indraught of air due to the rising of heated air in

the equatorial belt. They would blow from north to south but for the rotation of the Earth, which deflects them into north-east winds in the northern, and south-east winds in the southern hemisphere. As they are passing to warmer layers of atmosphere, where they can hold more moisture, they do not bring rain except when they encounter a barrier, whether of high coast or of mountains, by which they are forced upwards, chilled, condensed, and obliged to part with their moisture as rain. This happens most readily in summer, when the air over the land is also rising. The summer rains of the south-east of South Africa, and of Madagascar are due to this cause.

The trade winds which blow over North Africa have not passed over any considerable area of sea in their course from the north-east. They bring little moisture, so that North Africa is almost rainless except in the Atlas region, which is climatically part of the Mediterranean. In South Africa they have come over sea, but they part with their moisture on the highlands of the east, and blow over the west as dry winds.

Vegetation. Well marked vegetation zones correspond to these climatic zones. In the extreme north, where the Mediterranean climate prevails, the Mediterranean cereals, fruits, and evergreen woods are found (see fig. 131). Towards the edge of the desert these give place to poor grass lands, with scrubby mimosas, and other gum-yielding trees. In the desert itself plants grow in scattered tufts, and consist of thorny or fleshy plants, adapted in different ways for resisting drought. To the south the desert passes into poor scrub land, south of which lie the savanas, with summer rains. These savanas are often called park lands, a name which well describes them. The trees grow in clumps and glades, giving a beautiful and park-like appearance. They are often massive, like the baobab. New palms make their appearance, as well as tropical fruits, of which the banana is one of the most valuable. Still further south is the hot, moist, equatorial

forest with innumerable species of trees, creepers, parasites, fungi, and every form of vegetable life. Many descriptions have been written of the tropical forest, but every traveller ends by saying that it is impossible to give any idea of its rank luxuriance. It contains many plants useful to man,

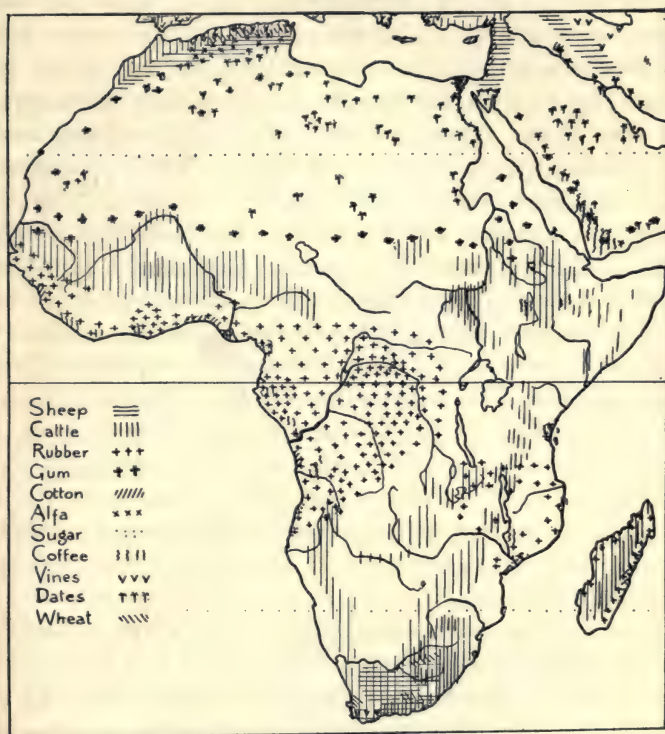


FIG. 131. Map showing the Distribution of some of the more important Plant and Animal Products of Africa.

such as rubber, but it is so impenetrable except along its rivers that little more than its fringe is known (see fig. 131).

South of the equator these zones are repeated in inverted order. The dense forest is succeeded by savanas, and these again by poor scrub lands, passing into desert, with scrub lands and temperate woods beyond their southern margin.

In temperate South Africa actual forests are rare. Plants of the heath type are very common. The fruits and cereals of Central Europe and the Mediterranean can be grown. (See fig. 131.)

Different animals are associated with these different zones of vegetation. North of the Sahara the animals are those of Southern Europe. On the margin of the deserts goats and camels are the chief animals, the camel being the only animal able to cross the desert. In the savana lands appear new animals, the antelope, zebra, giraffe, elephant, rhinoceros, lion, panther, hyena, leopard, and others. The hippopotamus makes his home in the swamps of the river banks. The river waters are infested by crocodiles. Of birds the wingless ostrich is the most notable. Insects are numerous, sometimes gigantic, and often dangerous. The termite, or white ant, destroys everything but stone, metals, and the hardest of woods. The tse-tse fly is fatal to cattle and horses. Many others make life a burden to the traveller. In the equatorial forest animals are crowded out by trees. The commonest are those which make their home in trees, including monkeys of all sizes. In the extreme south the animals of Europe have been introduced, including the merino sheep from Spain and the Angora goat from Asia Minor. Ostrich farms are numerous in the east.

The Atlas, or Barbary Region. This is a high mountain region, consisting of a fertile, well-watered strip of coastal plain, rising in the south to the Atlas Mountains. In the east the Atlas consists of two ranges, the Great Atlas and the Anti-Atlas, further east of three chains. It is highest in the west, where it rises to nearly 14,000 feet. The long slope to the Atlantic, which receives winter rains, is forested below the snow-line, and the lower slopes are fertile. Beyond this lofty range the land is arid, but the valley between the Great and the Anti-Atlas contains enough water to irrigate several oases.

The western part of this region forms the independent

state of Morocco (area about 219,000 sq. miles), which has three capitals, where the Sultan resides alternately, Morocco City, or Marakesh, in a plain encircled by the snow peaks of the Atlas, Mekinez, and Fez. Agriculture is carried on in the coastal plain, on the lower slopes or terraces, and in the oases. The olive, fig, orange, and other Mediterranean trees are grown north of the Atlas. The evergreen oak is the chief forest tree. Cereals are largely grown, barley covering many miles of the more fertile northern plains. In the oases, of which Taflet is the largest and most fertile, the date is the most important tree, though cereals and fruits are also grown. In the drier parts cattle, sheep, and goats are kept. Many wandering tribes combine pastoral occupations with raids for plunder.

East of Morocco the Mediterranean coast is bordered by a lower coastal range, separated from the northern range of the Atlas by a fertile valley called the Tell. The Tell is cultivated with vineyards, olive gardens and cereals. Between the two main ranges to the south lies a high arid plateau, dotted with salt lakes or shotts. Much of it is covered with the esparto, or alfa grass, which is exported for paper making. South of the southern range is a depression with another chain of shotts.

The western part of this region is the French colony of Algeria (area about 185,000 sq. miles). The capital is Algiers, built at the foot of and up the slopes of hills overlooking the Mediterranean. Oran to the west, with a fine harbour, and Constantine to the east, on a rock commanding the Tell, are next in importance. The eastern part is the French protectorate of Tunisia, of which Tunis is the capital.

The Sahara. The Sahara extends from the Atlas to the Red Sea, and from the Mediterranean to about 25° S. It is the largest desert area in the world, and is almost as large as Europe. It is continued eastward by the desert of Arabia, beyond which is the desert belt which stretches across Asia. This belt, therefore, extends from the Atlantic to the

Pacific, but it is in North Africa that it is broadest and most unbroken.

The surface of the Sahara is covered in parts with a scanty vegetation, but the greater part consists of sand-dunes, sometimes rising as high as 600 feet. Travellers have compared its surface to that of an ocean of sand, broken into crests and troughs, and have described the intolerable toil of climbing crest after crest, only to see before them an unbroken series of similar crests and troughs, glaring in the blinding sunshine. The sand of the desert is produced by the weathering of the rocks, and is not, as used to be thought, the bed of an old sea. In some parts the surface consists of rough stony tablelands, scoured bare of sand by the violence of the desert storms. Here and there in the lower parts water can be found at no great depth by sinking wells. Round such wells, or round natural springs, are oases of date palms, varying in size with the amount of water available for irrigation.

On the margin of the Mediterranean enough rain falls to make a narrow strip less infertile. This forms Tripoli and Barka, politically part of the Turkish Empire (area about 400,000 sq. miles).

The most important part of the Sahara is Egypt (area, excluding Nubia and deserts, 10,500 sq. miles), nominally Turkish, but under British control. It consists of the valley of the Nile, which varies from five or six miles in breadth in Nubia, to thirty miles in Lower Egypt. On either side of this ribbon of green stretches the desert.

The Nile Basin and Egypt. The Nile rises south of the equator on the Great Lake Plateau. Look at the map and trace its course (fig. 124). Its head stream, the Kagera, flows into the great Victoria Nyanza, or lake, which is nearly as large as Scotland. The river then descends from the higher to the lower plateau, forming falls, and flows into Albert Nyanza, which itself receives a large tributary from Albert Edward Nyanza, further south. After leaving Lake Albert the river

descends again, and then flows through the fertile savana land of the Sudan, forming swamps many miles wide, which become a great lake when the river is in flood. In this part of its course it is often blocked by masses of floating vegetation called the sudd, which it has torn from its banks and swept along with its current. On the northern edge of the Sudan, which is gradually passing into poor scrub, it receives two important tributaries, the Blue Nile and the Atbara, from the Abyssinian Highlands. At the confluence of the Blue Nile, a rapid mountain river, is Khartum, the capital of the Sudan. Below the confluence of the Atbara the river makes a great S-shaped bend, and flows for 1,800 miles in a steep-walled valley of varying breadth. The desert extends on either side, and the great river receives no other tributary for the remainder of its course. Below the mouth of the Blue Nile it forms six cataracts in the course of its descent to the Mediterranean, which it enters by a great delta (fig. 132). Notice that the Nile rises in the equatorial region of constant rains, and that its middle course and its Abyssinian tributaries are in the region of summer rains. To the first is due its steady flow, to the second its periodical floods in summer and autumn. On these floods depends the very existence of Egypt. Since the British occupation great engineering works have been undertaken to regularize the supply of water to the land. The river has been dammed at Aswan, at the first or most northerly cataract, at Asyut, and at the head of the delta, to hold back a proportion of the flood waters for distribution by irrigation canals during the season of low Nile. This slightly extends the area of fertile Egypt, and enables several crops to be grown in the year.

Wherever water can be brought Egypt is exceedingly fertile. Wheat is largely cultivated, as well as maize and millet, and barley. Pulses, and especially lentils, are a staple product. These are mainly winter crops. The summer crops are tobacco and cotton, which is becoming the most important of Egyptian products. Rice and sugar cane are grown in the

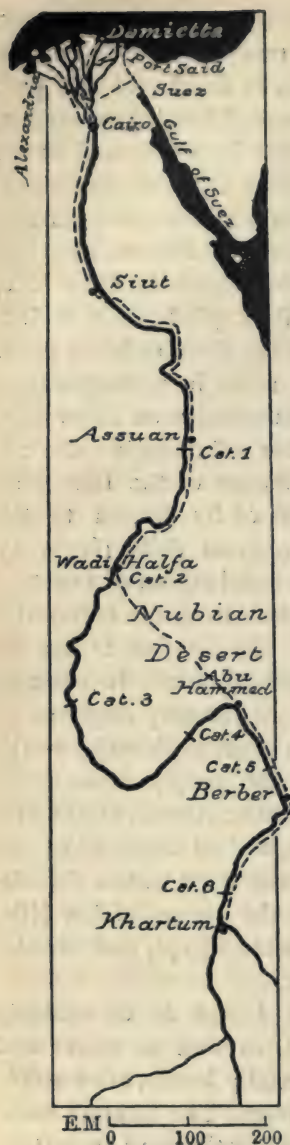


FIG. 132. The Nile below Khartum.

marshy delta. Date groves line the river far into the Sudan. (Refer back to figs. 106, 107.) The fruits of the Mediterranean ripen in the Nile valley as far south as the Sudan, where the banana becomes the most important fruit. Look at the map, and notice that the Nile forms the only practicable route across the desert from the Nile to the interior. The narrow isthmus of Suez, separating the Mediterranean from the Red Sea, is pierced by the Suez Canal, which saves the long sea route round the south of Africa. Egypt commands the canal, and controls the routes leading from it. This gives it its great political importance. Alexandria, west of the delta, one of the oldest cities in the Mediterranean, is the outlet for the Nile and Egyptian Sudan. Cairo, at the apex is the capital. Not far off are the famous Pyramids of Egypt. A railway runs from Cairo to Aswan, whence the traveller proceeds by steamer to the Second Cataract. From there a railway crosses the desert, avoiding the great Nile bend, to the Nile opposite Khartum (fig. 132).

Abyssinia. The Abyssinian Highlands are a volcanic plateau, rising to 14,000 or 15,000 feet. In many parts they are split by deep chasms or valleys, with sides a mile

in depth, whose perpendicular walls are formed of many-sided columns like those seen at Staffa or the Giant's Causeway. Such a country is extremely inaccessible. The climate and products of Abyssinia (area about 300,000 sq. miles), vary with the elevation. In the lowest, hottest parts, its climate and vegetation are tropical. Higher, in the region of summer rain and lower temperatures, coffee, vines, and cereals are grown in the savanas. Higher still are grown the hardier cereals, and animals are pastured. Abyssinia is an independent kingdom, the capital being Addis Halem. Towards this town a railway is being built from Jibuti, on the Red Sea in French territory, to the north of which is the Italian colony of Eretrea (area about 88,000 sq. miles). East of this is Somaliland, occupying the horn of Africa, and divided into British Somaliland (68,000 sq. miles) in the north, and Italian (136,000 sq. miles) in the south. It forms the eastern end of the Sahara.

The Plateau of the Great Lakes. This plateau rises in a series of terraces from the east coast to the interior. It is crossed by two great rifts, each partly filled by a chain of lakes. In the western of these rifts lie lakes Albert and Albert Edward, drained to the Nile, Tanganyika to the Congo, and Nyasa to the Zambezi. The lakes of the eastern rift are much smaller. (See figs. 124, 126.)

The northern part of the Lake plateau forms British East Africa, to the north of Victoria Nyanza. To the south of this lake is German East Africa. The whole of this region is less than 1,000 miles from the equator. The eastern coastal plain is narrow, fertile, and malarial. Above it rise two or more terraces, relatively dry and unfertile, though forming savana lands in some of the higher parts. Along the eastern rift are a series of extinct volcanoes, rising higher than any mountains in Europe. Look out in a map the highest peaks, Kenia and Kilima Njaro, both crowned with eternal snow. Beyond the rift the land rises to 8,000 or 10,000 feet, and will probably prove suitable for permanent

European settlement. It sinks again to the swampy shores of Victoria Nyanza, which lies about 4,000 feet above the sea. To the west extends the rainy equatorial belt, with dense tropical forest. From Mombasa, on the east coast, a railway has been built to Port Florence, on Victoria Nyanza, whence a steamer carries the traveller to the north-western shores, which form part of Uganda. Cotton is the chief product, and the banana the staple food. Above the western rift towers the magnificent snow-crowned group of Ruwenzori, overlooking Lakes Albert and Albert Edward. Between Lake Albert Edward and Tanganyika are a group of active volcanoes, discovered only a few years ago, and remarkable as being farther from the sea than any previously known.

Zanzibar and Pemba, two small islands off the east coast, are noted for their cloves. Both are British. Zanzibar is the most important port in East Africa.

The Niger Basin and Sudan. Immediately south of the Sahara comes the belt of lands with summer rains, extending across the continent to the highlands of Abyssinia. This belt forms the Sudan. It is a rich park land, with a fertile soil, in which are grown maize, millet, and other cereals, as well as many tropical fruits. It is drained by three great rivers, the Nile in the east, the Shari in the centre, flowing to Lake Chad, a lake of very varying dimensions, with no outlet to the ocean, and the Niger in the west. (See figs. 124, 126.)

The Niger rises near the coast and flows inland, forming a broad marshy flat valley like the middle course of the Nile. It runs to the south-east, breaking through the Niger Highlands in a densely forested gorge, from which it emerges first into open wooded lands and then into the dense forests of the Guinea coast. The oil palm is the chief tree of the delta and the lower Niger. Its largest tributary is the Benue, from the east. The delta of the Niger is typical of much of the Guinea coast, which is a low, unhealthy, densely forested land, rising to the north to the Guinea plateau, which is of no great height. It is intersected by innumerable creeks and rivers, which are

important means of communication in the impenetrable forests. At the mouth of the rivers, in the region uncovered by the tides, are mangrove swamps, with contorted roots, covered with slimy and reeking mud. The coast is destitute of harbours and is incessantly beaten by surf. 'It would be a drowning matter,' writes Sir H. M. Stanley, 'for a crew of sailors unaccustomed to the surf to attempt to land anywhere between the Sherbro and Lagos, a distance of 1,200 miles.' The tribes of these forested areas are extremely savage, practising horrible forms of religion, accompanied by human sacrifices.

The greater part of Central and Western Africa north of the Congo, about $1\frac{1}{2}$ million sq. miles, is French. The British possess the Lower Gambia, Sierra Leone, with Freetown, the one good harbour of the Western Guinea coast, the Gold Coast, Lagos, and Nigeria, consisting of the lower basin and delta of the Niger, the total area being about 165,000 sq. miles. The independent state of Liberia lies east of Sierra Leone. South of Nigeria is the German Kamerun colony.

The chief products of the Guinea coast are ground nuts in the west and the oil palm in the east. In the tropical forests of the delta and lower Niger rubber and other tropical products are obtained. Great attention is being given to the cultivation of cotton, for which the climate is well suited.

The eastern part of the Sudan has long been inhabited by races of Arab and negro blood, who have attained a relatively high degree of civilization. They are clever tillers of the soil, they practise many arts and crafts, and are accomplished traders. Their towns, instead of being mere collections of huts, like those of most negroes, are strong walled cities, some with a population of 100,000. Bida and Kano, both in the basin of the lower Niger, are great commercial centres of their Sudan trade. The other towns of the Niger are Lokoja, at the confluence of the Benue, and Timbuktu, at the great bend, the capital of the French Sudan.

The eastern or Egyptian Sudan has already been described. Communication is still in a backward state. Camel cara-

vans are used in the interior, towards the desert. Roads are little more than tracks. In the forest the rivers are the chief means of communication.

From Lagos a railway is being built towards the Niger, and others are projected. A French line connects the upper Senegal with the upper Niger, thus joining Timbuktu to the coast.

The Congo Basin. Look at the map and notice how the Congo basin is surrounded on all sides by high ground, down which the tributaries flow either north, or west. Trace the course of the main stream on the map. It rises south of Lake Tanganyika, and flows north through Lakes Bangweolo and Mweru, receiving the surplus waters of Tanganyika. Many of its tributaries rise quite near to those of the Nile. The most important is the Welle, which, like the main stream, flows through a country which is densely forested in the valleys, but rises to opener woods and savanas at higher elevations. The middle Congo is navigable for 1,000 miles to Stanley Pool, where it forms a lake-like expansion. Below Stanley Pool it breaks through the Lower Guinea Plateau in a densely forested gorge, forming falls and rapids, and enters the Atlantic by a deep estuary. A railway has been built from Leopoldville, on Stanley Pool, to Boma, to avoid the rapids, and carry rubber, ivory, and other forest produce to the coast. The natives of the Congo basin, like those of other densely forested parts of Central Africa, practise many revolting customs, including cannibalism. Politically the Congo basin is divided into the Congo State (area about 900,000 sq. miles), controlled by Belgium, French Congo to the north of the estuary, and the Portuguese territory of Angola (area about 457,000 sq. miles) to the south. The highlands of Angola are planted with coffee, which is carried by rail to the port of San Paul de Loanda.

The Zambezi Basin. Look at fig. 124, and trace the course of the Zambezi. The divide between it and the Congo is not very definitely marked. It rises in wooded highlands, but in

its lower course enters a region of dense forest. Like all the African rivers its course is broken by falls where it passes over the terraces of the plateau. The highest of these are the famous Victoria Falls. Above the falls the river is over a mile wide, and the gorge into which it plunges is only some 40 or 50 feet wide. The sheer fall is 400 feet. On the right the Zambezi receives a very large tributary, the Shire, which has come down from the Nyasa or Blantyre Highlands, forming rapids in its descent from terrace to terrace. These highlands, the most prosperous part of British Central Africa, are planted with coffee, cotton, cereals and fruits, according to the elevation. The lower course of the Zambezi lies in Portuguese East Africa. It enters the sea by a great delta, with mangrove swamps in its tidal area.

The middle portion of the Zambezi basin forms Rhodesia (area about 312,000 sq. miles), an undeveloped forest and savana land, probably rich in minerals. The railway from Cape Town is rapidly being pushed north and has already reached the Zambezi Falls. Very little of Southern Rhodesia is less than 3,000 feet above the sea. The greater part is above the fever-line, which is here about 4,000 feet. All kinds of cereals and fruits are or will be grown. The country is rich in minerals, especially gold, which was worked here in the time of King Solomon. The capital is Salisbury, joined by a line through Portuguese territory to Beira. From Salisbury a line runs to the Victoria Falls line, which goes south through Bulawayo across Bechuanaland into Cape Colony.

South Africa. South of the Limpopo the South African plateau is under 4,000 feet only in the river valleys. Like the rest of South Africa it rises from the sea in a series of terraces, forming undulating lands, grassy in the east and desert in the west (see fig. 124). The high grassy tablelands form the High Veld. The land is highest in the south-east, where it reaches 10,000 or 12,000 feet in the Drakensberg Mountains. These mountains, in which are the sources of the Orange and its tributary the Vaal, contain the finest scenery in

South Africa. Many of the peaks are above the snow-line. These mountains are sheer to the east with deep ravines and magnificent falls, the Tugela Falls, the most famous, having a drop of 1,800 feet. To the south are two terraces, the Great and Little Karroo, the former walled in by the Lange Berge, the latter by the Zwarte Berge. Looking from the Great Karroo northward to the High Veld, the escarpments of the terraces appear as mountains and are known by various names. The Karroos are dry high plains with scanty rainfall and vegetation. The east and south terraces and the eastern margin of the High Veld are fertile, and contain most of the population. The rest is poor grazing ground, passing in the west into the Kalahari desert. On the low warm coastal plain sugar is grown, with tea on the lower and maize and other cereals on the higher slopes.

In recent years the discovery of diamonds at Kimberley, in Cape Colony, near the confluence of the Vaal and the Orange, and of gold in the Transvaal, on the Witwatersrand, or Rand, the divide between the Vaal and Limpopo, has attracted a large population. From Johannesburg, on the Rand, the largest town in South Africa, lines run through Pretoria, the capital of the Transvaal (area about 120,000 sq. miles), to Delagoa Bay; through Pietermaritzburg, the capital of Natal (area about 35,000 sq. miles), to Durban, its port; and through Bloemfontein, the capital of the Orange River Colony (area about 48,000 sq. miles), to East London, Port Elizabeth, and Cape Town, the ports of Cape Colony. From these ports the line is connected, through Kimberley, with Bulawayo and the north. Sheep and goats are largely kept on the Veld and Karroos. Ostrich farming is important in the east of Cape Colony. Vineyards do well in the south-west, where the climate is that of the Mediterranean. (For routes and towns see fig. 133.)

Cape Town, the capital of Cape Colony (area about 277,000 sq. miles), occupies a magnificent site on a beautiful bay, behind which rises Table Mountain, 3,600 feet high, 'a steep

and partly wooded slope, capped by a long line of sheer sandstone precipices more than 1,000 feet high, and flanked to right and left by bold isolated peaks.'

African Islands. Madagascar is about twice the size of the British Isles. The west coast is low and swampy. Above, the land rises in terraces to a savana-covered plateau, which descends much more steeply to the narrow east coastal plain, fringed with lagoons. The lowlands are densely forested,



FIG. 133. Towns and Routes of South Africa.

yielding rubber. A railway connects Tamatave, the port, on the east coast with Antananarivo, the capital, in the centre of the plateau. Madagascar is a French possession and is being rapidly opened up.

Réunion (950 sq. miles), a French, and Mauritius (700 sq. miles), a British island, are both volcanic. They yield sugar, coffee, vanilla, and other tropical products. Port Louis is the capital of Mauritius.

St. Helena and Ascension are volcanic islands in the Atlantic. Both are British. The Cape Verde Islands and Madeira, also volcanic, belong to Portugal. They produce sugar, and Madeira wine. The Canary Islands are Spanish. They produce sugar, wine, and bananas. The most beautiful is the volcanic peak of Teneriffe.

Peoples of Africa. In the north the Arabs and Berbers, belonging to the white race, form the bulk of the population, with Europeans in the settled parts near the Mediterranean coast. Peoples of white stocks are found as far south as Abyssinia, and even in the Great Lake Plateau. In the Sudan they are much mixed with negro blood. The bulk of the population of the Sudan and West Africa is negro. Of these the Hausas are the most civilized, and their language is the great commercial tongue of West Africa. South of the equator the Bantu negroes are in the majority. Their languages are all related to each other, and one of them, Swahili, is the commercial language of East Africa. In the forests are remnants of a dwarf race, the Pygmies. In the south-west the Hottentots and Bushmen are gradually dying out, but the Kaffirs, of Bantu stock, are increasing, and form the large majority of the population of South Africa. Of Europeans in South Africa the majority are of Dutch origin. The others are English, French, and German. Of the African races the Arabs, who profess Mohammedanism, and the tribes in contact with them, are the most civilized. The inhabitants of the savanas are superior to the forest tribes, who have many degraded customs and superstitions. The peoples of Africa are settled or nomadic, according to the nature of the occupation. The Arabs of the desert, for instance, are wandering herdsmen, while in agricultural regions the same race builds and inhabits walled cities.

The population is supposed to be about 160,000,000. It is nowhere very dense, except in Egypt. The Sudan, the Barbary Coast, and the fertile parts of South Africa come next in density.

AUSTRALASIA

Position. The continent of Australasia consists of three large and several small islands. It stretches from the equator half way to the South Pole; and Australia, the largest, is nearly 3,000,000 sq. miles or about $\frac{3}{4}$ the size of Europe. New Guinea, to the north, the second in size, is about $\frac{1}{10}$ the size of Australia. Tasmania, to the south, separated from Australia by Bass Strait, is about $\frac{1}{10}$ the size of New Guinea. Notice that all these lie on the same continental shelf.

Seas, Gulfs, Peninsulas, and Islands. Notice that Australia is as compact in form as Africa (fig. 134). The only considerable gulf is on the north coast, the Gulf of Carpentaria, forming the peninsulas of Arnhem Land and Cape York. In the south is the great incurve called the Great Australian Bight. Notice also the smaller Spenser and St. Vincent Gulfs on the south coast.



FIG. 134. Map showing Distances from Sea in Australia.

Relief. Look at the relief map in fig. 135, on which are drawn the lines for 600 feet below sea level, and for 600, 1,500 and 3,000 feet above it. Notice that the only considerable area of land over 3,000 feet is in New Guinea, where the backbone of the island is formed by a lofty mountain range, probably higher than Mont Blanc. The southern part of New Guinea is a lowland. The only approach to a range of mountains in Australia is along the east coast, where the highlands are known as the Great Dividing Range, with special names in different localities. These highlands rise steeply from the east coast, and slope west to a lowland which stretches almost from north to south of the continent

Further west the land is a low tableland, with a few highland masses rising above it. Tasmania resembles the eastern highlands of Australia, of which it is a continuation. The islands of New Zealand are mountainous.

The Eastern Highlands, or Great Dividing Range, are known in different parts under different names. In the south, where

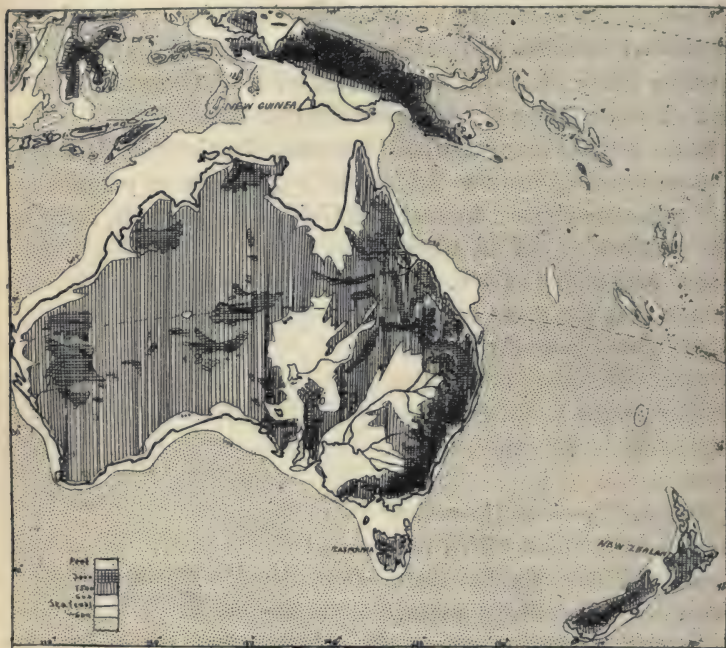


FIG. 135. Physical Features of Australia.

they rise highest, the Blue Mountains and the Australian Alps may be noticed. The Blue Range rises from the lowlands in steep escarpments, which are extremely difficult to climb. Deep sunken valleys, with lofty precipitous walls, end in impassable gullies, and it took early settlers many years to find a route through this mountain barrier to the interior. In the south-east the Australian Alps rise in Mt. Kosciusko to

over 7,000 feet, the last few hundred feet being above the snow-line.

The short eastern slope of the Great Dividing Range is drained by rivers of no great length to the Pacific. The western slope, which is seldom more than 100 miles from the coast, is drained to the interior. The only great river system in Australia is that of the Murray-Darling in the south-east. ^{arling} The Murray is formed by the Lachlan and Murrumbidgee from the Blue Mountains and the Murray from the Australian Alps, all coming through steep gorges in the highland part of their course. The Murray unites with the Darling, whose head stream has risen in the Great Dividing Range near the tropic of Capricorn, and which has received numerous tributaries from the central parts of the highlands. The united river is turned south by the South Australian Highlands, and enters the sea through a great lagoon, Lake Alexandrina. A great part of this system of rivers is navigable during the wet season, but in the dry season many of the rivers composing it run dry, though the Murray, which is fed by the snows of the Australian Alps, is a permanent river. The northern half of the Eastern Highlands are lower and farther from the coast, and the rivers which drain the seaward slope are longer. The Fitzroy and Burdekin may be noted. The western slopes are scored by many long river beds, but these are filled only in the wet season. When full they flow to Lake Eyre, in the centre of the continent, a basin of inland drainage similar to the Caspian and Aral seas in Eurasia, and Lake Chad in Africa (fig. 136). Round the north and west coast short rivers from the tableland flow to the sea. The south and centre are practically rainless, and have no rivers.



FIG. 136. The Inland Drainage Area of Australia is shaded on this Map.

Climate. Only the extreme south and the higher ground has a winter temperature under 60° F. The summer temperature is extremely hot, for not only is the greater part of the country in tropical latitudes, but it is broadest where the tropic crosses it. The difference between the summer and winter temperature is great, but rather because the summer is extremely hot than because the winter is cold. If, however, we compare the temperatures with those of North Africa, which is situated at a similar distance from the equator, we find that the sea does somewhat reduce the range of temperature in Australia.



FIG. 137. Mean Annual Rainfall of Australia.

FIG. 138. Dry and Rainy Seasons in Australia.

Look at the rainfall map in figs. 137, 138 and notice that only in New Guinea, East and North Australia, and Tasmania is the rainfall at all heavy. Over the greater part of Australia the rainfall is less than 10 inches, and within this area large areas receive only 5 inches or less. Much of the interior, therefore, is a rainless desert, of the same kind as the Sahara in North Africa, and the Kalahari in South Africa. Like these deserts it lies in the trade winds area. These have parted with their moisture on the seaward slopes of the Eastern Highlands, and become hotter and drier as they pass inland. New Guinea lies

near enough to the equator to receive abundant and frequent rains, like the equatorial regions of Africa. In North Australia the winds blow in summer from the sea to the land, bringing summer rains, as in the monsoon lands of Asia. The Australian summer, as in all lands south of the equator, occurs during the northern winter. Tasmania lies in the track of the stormy west winds, which bring rain at all seasons. The southern part of the Eastern Highlands is in this belt in winter.

Australia, therefore, has many types of climate, but none of which we have not already had examples. The climate of Tasmania may be compared with that of Northern France, the extreme south of the Eastern Highlands with that of the Mediterranean, the centre of the continent with Northern Africa and Arabia, and the northern coast with India. That is to say, allowing for differences in the arrangement of land and water, and of highland and lowland, we get the same zones of climate south of the equator as we have found north.

Vegetation and Products. Australia was early separated from the rest of the Old World by deep seas, and its plants and animals are peculiar to it. Its native trees are all suited to a hot dry climate, and a very strong sun. The chief trees belong to the eucalyptus, or gum-tree family, or to the acacias, or wattles. Much of the continent is too dry for trees, and is covered, where it is not mere sandy or stony desert, with a scrub of thorny plants, which is very difficult to penetrate. Most of the coast region and the less arid parts of the interior are grass lands, which make the keeping of stock one of the most important of Australian industries. (See fig. 139.)

At the time of its discovery by Europeans Australia possessed none of the domesticated animals of Europe. Its native animals included the kangaroo and opossum, the young of which is carried by the mother in a sort of pouch. Many of the birds and reptiles were strikingly different from those of the Old World. European colonists have introduced domesticated animals, and some wild ones. Of these, the rabbit has so multiplied as to be a national danger, by

destroying young crops and other vegetation. Rabbit-proof fences are erected in many districts, and vigorous measures are adopted for thinning out this troublesome vermin.

The cultivated plants of the Old World have also been generally introduced in areas with suitable climates. Thus the cultivated products of Tasmania resemble those of Northern France, Tasmanian apples being exceptionally excellent. In



FIG. 139. Distribution of Sheep and Cattle in Australia.

the south-west and south-east the fruits and cereals of the Mediterranean, including the vine, are grown. The greater part of the interior is too dry for cultivation. The most desert parts are crossed by camels, which have been introduced from Asia. In the east and north-east the products of the hotter monsoon lands are grown, more particularly sugar. The cultivation of tea and cotton is beginning. In the extreme

north of Australia and in New Guinea are tropical forests, producing rubber, &c.

The mineral wealth of Australia is very great, and as a gold-producing country it ranks second in the world. Agriculture is hampered by the scanty rainfall, which also hinders sheep-farming, the principal occupation. The original population is dying out, and the country is peopled by colonists of British descent. In the tropical north the climate is trying for Europeans, and Kanakas, from the islands of the Pacific,



FIG. 140. Towns, Railways, and Telegraph Routes of Australia.

have been introduced. Manufactures are only beginning, and cannot develop till there is a much larger population. Railways have been built in many parts from the coast to the interior. They are best developed in the east, where a line connects the chief towns of Queensland, New South Wales, and Victoria with each other. (See fig. 140.)

Politically the whole continent is British, except parts of New Guinea, which are Dutch and German. The British part is a dependency of the Australian Commonwealth.

The Commonwealth of Australia consists of six states, Queensland in the north, New South Wales to the south, and Victoria in the south-east, South Australia in the centre, extending across the continent from north to south, West Australia in the west, and Tasmania (fig. 141).

Queensland. Queensland (668,500 sq. miles) is crossed by



FIG. 141. The States of the Australian Commonwealth.

the tropic of Capricorn, and its products are those of tropical lands. It is the rainiest and best watered of the colonies, and has the largest forest areas, producing valuable timber. The coast is cultivated with sugar, the eastern part of the highlands with cereals, especially maize, and the interior is pasture land on which millions of sheep are kept. In the

drier parts irrigation is practised by sinking artesian wells, which bring water to the surface. The mineral wealth is very great, gold in particular being very abundant. The colony is still very thinly populated, and most of the towns are on the coast. The capital and chief port is Brisbane. Rockhampton is also a rising port, and the starting-point of an important line into the interior.

New South Wales. New South Wales (310,700 sq. miles) lies outside the tropical part of Australia. The coast is well watered and fertile. In the extreme north sugar is cultivated. Cereals and fruits are largely grown. Its chief wealth however is in sheep, which are bred for their wool. Coal is found at Newcastle, on the Hunter river. Gold is very abundant in the eastern highlands. Silver is mined round Broken Hill. The capital is Sydney, on Port Jackson, one of the most magnificent bays in the world.

Victoria. Victoria (88,000 sq. miles) to the south of New South Wales is the smallest and most rugged of the colonies, and also the most densely peopled. As in the colonies already named sheep-farming is the most important occupation. Irrigation is practised near the Murray, and fruits and cereals grown. The vine does well on the sunny hill slopes, which are, of course, those facing the north. Wine, fruit, dairy produce, rank next after wool in the resources of Victoria. The colony is very rich in gold, and there are important fields round the mining towns of Bendigo and Ballarat. The capital is Melbourne, on Port Phillip. Geelong is beginning to manufacture wool.

South Australia. South Australia (900,000 sq. miles) is for the most part desert. It is fertile only in the north, where tropical products are cultivated, and in the south, where wheat of poor yield but extremely fine quality is grown. Sheep-farming is important, but drought often causes great losses of stock. The capital is Adelaide.

West Australia. West Australia (976,000 sq. miles) is also mainly desert. The south-west is forested, containing

the valuable hard timber of the karri and jarrah trees. Along the west coast, which is the most thickly peopled part, agriculture is carried on, and the vine is grown. Fruit growing is becoming important, and sheep and cattle are kept in the river valleys. Gold is very abundant in the interior. The mines of Kalgurli and Coolgardie, are the most famous, but there are many others. Great engineering schemes have been undertaken to supply these rich gold-bearing districts with water. The capital is Perth, near the coast.

Tasmania. Tasmania (26,000 sq. miles) is about the size of Scotland. It is rich in minerals, though gold is not found. The vegetation resembles that of the wetter parts of Australia. The island is well wooded. Fruit and hops are largely grown. Sheep-farming is important. The capital is Hobart.

New Zealand. New Zealand (105,000 sq. miles) consists of two large islands, the North Island, and the South, or Middle Island, separated by Cook Strait, and the small Stewart Island, in the extreme south. The islands lie between 34° and 48° S., extending from the latitude of Sydney to 250 miles south of Tasmania. They are from 1,000 to 1,200 miles from Australia, from which they are separated by deep seas.

Look at the relief map, which shows the lines for 600 feet below sea-level, and for 600 and 3,000 feet above sea-level (fig. 142). The North Island is much lower than the South Island, where Aorangi, or Mt. Cook rises in the Southern Alps to over 12,000 feet. The glaciers of the Southern Alps are very extensive and descend into the forest zone. The valleys with their long narrow lakes, and the fiords of the coast resemble those of Scotland. The North Island contains the active volcanoes of Ruapehu, over 9,000 feet, and Tongariro, over 7,500 feet. The extinct cone of Mt. Egmont, over 8,000 feet, is often compared with that of Fujiyama, in Japan. Geysers, hot springs, and other signs of volcanic activity, occur.

New Zealand lies in latitudes corresponding to those parts

of Europe between Gibraltar and northern France. The climate is similar, but more equable, owing to the influence of the sea on the long, narrow islands. The north of the North Island has the Mediterranean climate, with summer rains, and grows the cereals and fruits of that region. The



FIG. 142. Physical Features of New Zealand.

forests of the North Island contain valuable timber, including the kauri pine, which furnishes a most useful gum. Large deposits of this gum, the produce of forests long perished, are dug out of the ground. The southern part of the North Island, and the rest of New Zealand have rain at all seasons,

brought by the westerly storms. The west coast is therefore the wetter, as in Britain, and the east coast drier. The west is covered with forests. The drier east is pasture land, on which millions of sheep are fed, the finest being kept on the famous Canterbury Downs, in the lee of the Southern Alps. Parts of the lowlands are cultivated with wheat and other temperate cereals. The mineral wealth, especially in coal and gold, is considerable. The gold occurs not only in the rocks, but can be washed out of the river sands. The chief exports are wool, frozen meat, tallow, hides, and other pastoral products. The largest town is Auckland, on the narrow isthmus separating the north-west peninsula from the west of the North Island. It has harbours on both sides of the isthmus. The capital is Wellington, in North Island, on Cook Strait. In the South Island Christchurch and Dunedin, on the east coast, export the produce of the pastoral districts. Hokatika and other ports on the west coast export gold and coal.

The Pacific Islands. The Central and Western Pacific are studded with small islands between 30° N. and S. The most important are Hawaii (American), Fiji (British), and Samoa (German and American). The majority are either mountainous forested volcanic islands, or low coral islands. The climate is hot but equable. The wet and dry seasons are well marked. The volcanic islands are the more fertile, growing sugar, bananas, and other tropical produce. The coco-nut palm is important along the coast, and the dried flesh of its nut supplies copra, which is used in many manufactures. The inhabitants of the islands of the south-west are short, dark, and frizzy haired, belonging to the Papuan, or Melanesian race. In the eastern islands they belong to the tall, fairer, and much more intelligent Polynesian race. The majority are clever sailors and fishers, and practise many arts. In recent years many Chinese and Japanese have emigrated to the archipelago, especially to Hawaii, where they cultivate the plantations.

AMERICA

NORTH AMERICA.

Position. Look at fig. 144 and note the position of North America. It almost touches Asia in the north-west, where the two continents are separated by Bering Strait, and comes nearest to Europe in the north-east. It is broadest to the north and tapers to the south where it is joined to South America by the narrow isthmus of Central America. On the west it is bounded by the Pacific Ocean, on the east by the Atlantic, and on the north by the Arctic Ocean. The mainland begins about 500 miles from the equator, and extends to within 1,500 miles of the North Pole.

Seas, Gulfs, Peninsulas, Islands. Notice the three great gulfs, the Gulf of Mexico, in the south, between the peninsulas of Florida and Yucatan, Hudson Bay, in the north-west, almost shut in by the Labrador peninsula, and the

long, narrow gulf of California, in the south-west, separating the peninsula of Lower California from the mainland. Notice also the four island groups, (1) the chain of the West Indies stretching from Yucatan to the South American end of the Caribbean Sea. (2) Newfoundland across the Gulf of the St. Lawrence, (3) the Northern Archipelago, of which Greenland and Baffin Land are the largest islands, and (4) the islands off the fiords of the northern part of the Pacific coast. The area of North and Central America and the West Indies

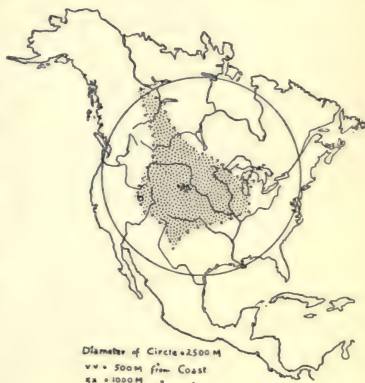


FIG. 143. Distances from Coast.

is about 9,600,000 sq. miles. Few parts are more than 1,000 miles from the coast. (See fig. 143.)

Relief. Look at the relief map of North America, on which are drawn lines at 600 feet below sea-level, and at 600, 3,000,



FIG. 144. Key to Physical Features of North America.

and 6,000 feet above it. Notice that the highlands lie near the Atlantic and Pacific coasts, while the lowlands occupy the centre of the continent, or form narrow coastal plains. The continent may be divided into (1) the Western Mountains,

(2) the Eastern Highlands and Greenland, and (3) the Central Lowlands.

The centre of the Western Mountain system consists of a belt of plateaus of varying breadth, bordered east and west

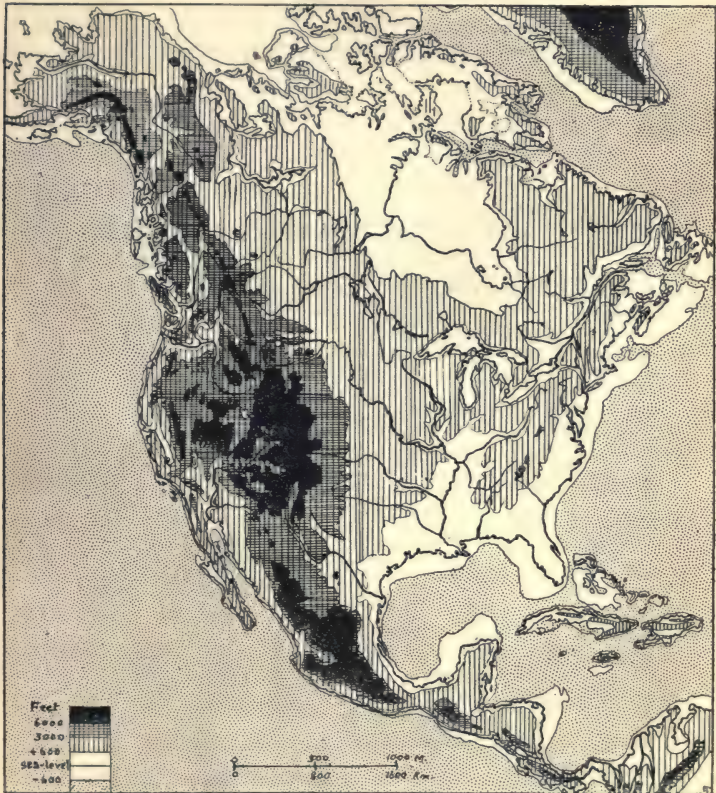


FIG. 145. The Physical Features of North America.

by long and lofty mountain chains. The eastern chain is called the Rocky Mountains. The western chains are known as the Alaskan, Cascade, and Sierra Nevada Mountains. In the north the plateau is low and broad, forming the basin of the Yukon, to the south of which the Alaskan ranges rise

to peaks of 18,000 or 19,000 feet, with great glaciers and snow-fields. To the south the plateau is higher and narrower, forming the basins of the Fraser and Columbia rivers, which rise in the Rockies to the east, and break through the Cascades in magnificent gorges to the Pacific coast. South of the



FIG. 146. Grand Cañon of the Colorado River. After W. H. HOLMES.

Columbia, the plateau attains its greatest height between the Sierra Nevada on the west and the Rockies on the east. It is known as the Great Basin. Much of it is a basin of inland drainage, with Great Salt Lake in the east. The southern part of the Great Basin is drained by the Colorado river, flowing in gorges sometimes a mile deep, and so narrow

as to seem rather cracks in the earth than valleys (see fig. 146)¹. Still farther south is the Mexican plateau, ending in a great chain of volcanoes, of which the highest is the nearly extinct Popocatepetl (figs. 144, 145).

Through the greater part of the western mountain system a third range can be traced to the west, sometimes as a Pacific coastal range on the mainland, sometimes in the islands, such as Vancouver, fringing the coast. It is separated from the western chain of the Alaskan, Cascade, and Sierra Nevada Mountains by valleys, or by narrow straits or sounds.

Look at the map and notice that at the eastern base of the Rockies the land is over 3,000 feet above sea-level. It slopes almost imperceptibly to the lowest line between Hudson Bay and the Gulf of Mexico, where it is rarely more than 600 feet high. To the east it rises gradually to the Eastern Highlands. Broadly speaking it forms a great plain extending from the Arctic Ocean to the Gulf of Mexico between the Eastern and Western Highlands, narrowing in the south where the continent tapers. It contains four great river basins, the Mackenzie, flowing to the Arctic Ocean, the Nelson flowing to Hudson Bay, the St. Lawrence flowing to the Atlantic, and the Missouri-Mississippi, flowing to the Gulf of Mexico. Notice the ring of lakes round Hudson Bay, most of which are drained by the Mackenzie, Nelson, and St. Lawrence. This part of the Central Lowland is a lakeland like that round the Baltic. The St. Lawrence drains the Great Lakes, Superior, Michigan, Huron, Erie and Ontario, the largest body of fresh water in the world. Notice that there are no lakes in the Mississippi basin.

The Eastern Highlands are divided by the St. Lawrence into the Labrador Highlands in the north, and the Appalachian Highlands in the south, with few points over 5,000 feet

¹ Deep narrow valleys of this kind are called in western America 'canyons.' The term is a convenient one to describe such valleys wherever they occur, as, for example, the valley of the Tarn in France or of the Orange in South Africa.

high. Both are densely forested. The Appalachians are bordered in the east by a coastal plain, which widens out to the south. It is crossed by a number of short but important rivers, the lower valleys of which are drowned by the sea, forming excellent harbours. Of these most important are the Hudson, Delaware, Susquehanna and Potomac, the last two forming the deep inlet, or drowned valley, of Chesapeake Bay.

Greenland is a vast island, about $\frac{1}{4}$ the size of Australia, lying almost entirely within the Arctic Circle. It is buried



FIG. 147. The Mean Temperature of North America in January reduced to sea-level.



FIG. 148. The Mean Temperature of North America in July, reduced to sea-level.

beneath a sheet of ice of unknown depth, except for a small strip on the south of the west, to which it owes its name. In the interior it rises to a height of about 8,000 feet above sea-level.

Climate. North America, with its extension from north to south, and its great variety of elevation, has, like Asia, and for the same reasons, every variety of climate. In the extreme north and in Greenland the snow lies all the year round, and over a great part of the north the winter lasts from three to eight months. Look at fig. 147 and notice how large a part of the continent has a temperature below the freezing-point in

the month of January. In fig. 148, which shows the summer temperature, notice how far north the line of 50° extends. Thus a great part of the continent has an extreme climate with cold winters, and warm or hot summers. Notice that, in



FIG. 149. Mean Annual Rainfall.

summer, as we should expect, the heat increases from the coast to the interior, and the highest summer temperature is found in the south-west of the central lowlands.

Look at the rainfall map in fig. 149, and notice that the east coast is wet from Newfoundland southwards. The rain-

fall diminishes slowly, but steadily, from the coast to the interior. West of the Mississippi the rain falls chiefly in summer, and is scanty. In the extreme west the lowlands become very dry. On the west coast the north has rain at all seasons, but most in winter (fig. 150). This is succeeded to the south by a belt 500 to 600 miles long with only winter rains, that is, a Mediterranean climate. The lofty western ranges of the Sierra Nevada prevent the winds from reach-



FIG. 150. Seasonal Distribution of Rainfall in North America.

ing the Great Basin, which is a rainless desert. Still farther south is the dry calm area, where deserts of great extent would occur, as in North Africa, if the continent were broad instead of very narrow. Southern Mexico and Central America lie in the region of summer rains immediately north of the equator.

Vegetation. The vegetation zones, like the climatic zones, correspond with those of the Old World. In the north are the unbroken ice and snow of Greenland and the islands of the

Northern Archipelago, with the tundra to the south. Next come the forests, scanty and dwarf on the tundra edge, but



FIG. 151. Map showing the Distribution of Forests in North America.

passing into magnificent forests of conifers further south. These again pass into mixed woods, which extend further

south along the wetter coasts than in the drier interior. In the southern part, and along the east coast, they have been partly cleared for agriculture (see fig. 151).

Next come the steppe or grass lands, the richer eastern parts of which are called prairies in America. These become drier in the east, passing into desert in the south-west. Southern Mexico and Central America are rugged elevated



FIG. 152. Distribution of Sheep and Cattle in North America.

lands, in which all zones occur, from the tropical forests on the coastal plains to the tundra-like areas of the highest mountains, lying below the snow-line, where all vegetation ceases.

Animals. The animals of North America resemble those of the Old World. Large herds of cariboo, or reindeer, and moose, or elk, roam over the tundra. Beavers and other fur-bearing animals are found in the northern forests, and bears

in the Rockies. Wild animals are not numerous outside the forest and western mountain areas. The important animals are the domestic animals of the Old World, sheep, cattle, pigs, and horses, which are kept in immense numbers (fig. 152).

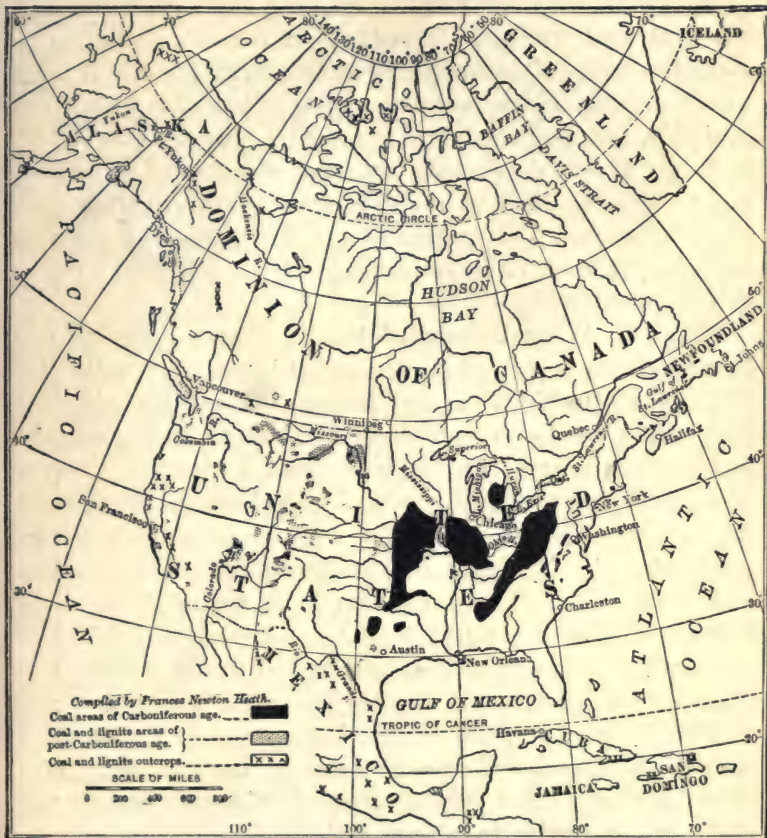


FIG. 153. Map showing the Distribution of Coal in North America.

Minerals. Minerals are abundant in the western mountains, and the Eastern Highlands. Coal and petroleum are found in the lowlands (see fig. 153).

Occupations. The occupations carried on in North America resemble those of Europe. Lumbering is extremely im-

portant in Canada, where the lumbermen go to the forests in winter to cut trees, which are dragged over the frozen ground to the river, to be floated down in spring. Fisheries are important on both the Atlantic and Pacific coasts, as well as in the Arctic waters. The Central Lowland is agricultural in the east and south, and pastoral in the drier west. The Atlantic seaboard is densely peopled, with large and busy manufacturing cities, wherever coal and water power are available, and numerous ports along the coast. The Pacific seaboard is less developed, but there are several important ports. Several lines of railway cross North America from ocean to ocean. The eastern part of the continent is covered by a network of lines, connecting all the important towns with each other (fig. 154).

Peoples. When discovered by Europeans America was inhabited by a coppery brown, straight-haired race, called by the settlers Redskins or Red Indians. They depended for their living partly on agriculture, but chiefly on hunting the bison, which roamed in immense herds across the steppes. The bison have wholly, the red men largely, disappeared before the white man, and are now found only in special reservations in the plains, and in the mountains of the north and south. The Europeans who have replaced them are chiefly of Spanish descent in the south, and of British descent, with a considerable intermixture from the continent of Europe, in the centre and north. There is a large population of French descent round the St. Lawrence. In the southern states are several millions of negroes, the descendants of slaves imported from Africa, chiefly in the seventeenth and eighteenth centuries, to work at agriculture in the hot south.

Political Divisions. The British lands of Canada and Newfoundland occupy the whole of the north, except Alaska in the north-west, which belongs to the United States. The Federal Republic of the United States stretches across the centre of the continent, from the Atlantic to the Pacific, and from British America to the frontiers of Mexico. The Re-

public of Mexico occupies the tapering southern portion of the continent between the Atlantic and the Pacific. Central America is divided between a number of small republics. The West Indies are divided among several powers. Cuba, the largest, is a republic protected by the United States.

BRITISH NORTH AMERICA.

British North America (area about 3,800,000 square miles) consists of the Dominion of Canada on the mainland, and the island colony of Newfoundland, which includes the east coast of Labrador on the mainland.

Canada. Canada is bounded north by the United States territory of Alaska, and the Arctic Ocean; and by the Pacific and Arctic Oceans on the west and east. The southern or United States boundary corresponds with no natural feature, except the Great Lakes, the northern shores of which are Canadian.

The surface of Canada consists of a western mountain area, a central plain partly submerged by Hudson Bay, and highlands in the east. The northern part of the mountainous west forms the Yukon basin, a frozen land, with thin scrub on the hill sides. The discovery of the rich gold-fields of the Klondike created Dawson City, which is reached by rail from Dyea through United States territory. The Klondike gold-fields can only be reached from Canada over difficult passes which are inaccessible for much of the year. South of the Yukon the land is a sea of mountains, with deep forested valleys very difficult to penetrate. On the Pacific coast these descend to deep fiords, bordered by islands, of which the most important is Vancouver, with Victoria, the capital of British Columbia, the mountain state of Canada. Vancouver, on the mainland, on an inlet near the mouth of the Fraser, is the Pacific terminus of the Canadian Pacific Railway. The line is carried up the western slopes of the mountains by the gorge of the Fraser, and then crosses the parallel Gold, Selkirk and Rocky Mountains, through magnificent scenery of snow peak, glacier, pine forests, deep gorges, and roaring torrents.

The floors of the valleys are fertile but thinly settled. In the eastern ranges gold, silver, and coal are abundant, and branch lines run to the mining districts. The main line descends the eastern slopes of the Rockies to the plains, which are here too dry for agriculture, and form great cattle ranches, or ranges. The winds which blow over them are dry, having parted with their moisture on the western slopes, and as they descend they become warm. Where these 'chinook' winds blow in spring the temperature rises rapidly, and snow disappears as if by magic¹. Towns are few in this part of the plains, which has only been settled since the railway was made. The line follows the valley of the Saskatchewan, the main stream of the Nelson, to the agricultural eastern plains. Here the cold is great in winter and the soil frozen, but when the spring thaws come wheat roots quickly in the moist soil. Light rains fall in early summer, when the ear is filling, and abundant sun ripens it. Manitoba, and particularly the lake plain crossed by the Red River valley, is covered in summer with ripening wheat as far as the eye can reach. At the stations great elevators are built, to which the grain is brought, to be carried eastward. Towns become numerous, the largest being Winnipeg, on the Red River, near Lake Winnipeg. North of the main line lie large newly settled tracts, to which branch lines are growing. With its fertile soil, and numerous navigable rivers and lakes, it will become a prosperous agricultural region. East of Manitoba the line enters the forest area, and reaches Lake Superior at Fort William, where steamers are loaded with grain for the ports of East Canada and Europe. The line leaves the lakes and follows the Ottawa valley, to Ottawa, the capital of the Dominion, with a great lumber trade and many saw-mills driven by water power from the Chaudière Falls. Its Atlantic terminus is Montreal, on an

¹ When water vapour passes into water heat is set free and the temperature rises. The warm föhn winds of the Alps, called by the Swiss 'snow-eaters,' are due to the same cause. In New Zealand similar winds, the nor'westers, blow over the Canterbury plains.

island, where the Ottawa enters the St. Lawrence (see fig. 154). Montreal is the chief commercial and manufacturing centre of Canada, and the busiest port, shipping the produce of its forests, ranches, and wheat lands, and the fruit and dairy produce of the Lake Peninsula. This, the richest part of Canada, lies between Lakes Huron, Erie and Ontario, in the latitude of Southern France. It is covered with vineyards, orchards, market gardens, and dairy farms. Special fruit trains carry

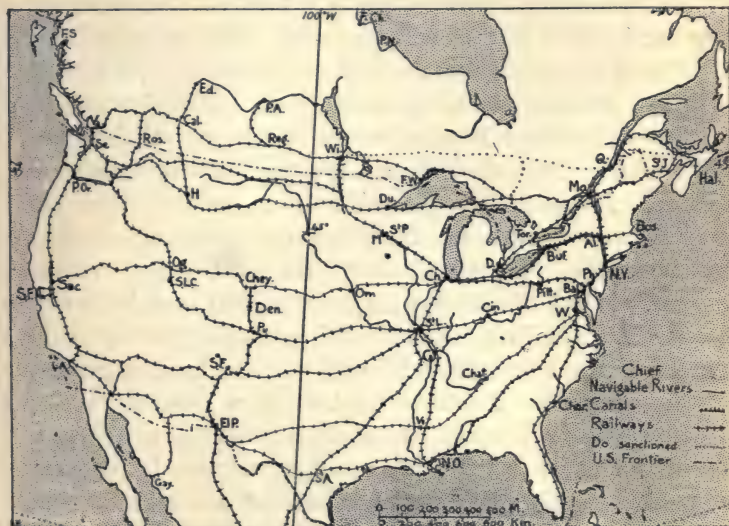


FIG. 154. Main Railway Routes of Canada and the United States of America.

its fruits and vegetables to the market centres. Toronto, on Lake Ontario, is the chief town and manufacturing centre. Many busy towns lie on or near the northern shores of Ontario. Between Erie and Ontario are the famous Niagara Falls. To avoid them the Welland Canal has been cut. Another canal, the Soo, or Sault Sainte Marie, avoids rapids between Superior and Huron. With the aid of these canals there is through connexion by the Great Lakes and St. Lawrence between Fort William and the ports on both sides of the Atlantic. Large ocean steamers come up the St. Lawrence as far as

Montreal. At the head of the estuary is Quebec, finely built on heights commanding the river. In the fertile district south of the St. Lawrence, between Montreal and Quebec, a number of small manufacturing towns have grown up.

North of the St. Lawrence and the Great Lakes lumbering is the chief occupation. The Labrador peninsula, and the country round Hudson Bay, a land of lakes and forests, is visited only by hunters and fur traders.

New Brunswick, south of the St. Lawrence, is a forested hilly land, with fertile valleys. St. John, the capital, is a lumber and fishing port. The peninsula of Nova Scotia and Cape Breton Island are also forested, with rich pastures and orchards round Fundy Bay, which is remarkable for its high tides. The capital is Halifax, with a magnificent harbour. As the St. Lawrence is frozen in winter Halifax and St. John, which are ice free, are of great importance to Canadian trade. The mineral wealth of these eastern provinces is great. Nova Scotia has large coal-fields, especially round Sydney, in Cape Breton Island, with great iron works. Prince Edward Island is covered with orchards and market gardens.

Newfoundland. Newfoundland is an undulating land of lake and forest. Its mineral wealth is great but undeveloped. Its cod and other fisheries are among the most important in the world. Fishing fleets sail from St. John's, to the seal and whale fisheries of Labrador, Greenland and the Arctic Seas.

THE UNITED STATES.

The United States (area about 3,000,000 sq. miles), like Canada, consists of mountains in the west, plains in the centre, and highlands in the east. The western mountain area is much broader than in Canada, and more arid. The Pacific is bordered by a coastal range, behind which are long fertile valleys, the rivers of which, like those of British Columbia, have famous salmon fisheries. In the north, opening to Puget Sound, are rich wheat lands. The largest town is Portland, on the estuary of the Columbia. The Californian valley to

the south is drained by the Sacramento. It produces wheat in the north, and in the south vines, peaches, oranges and other Mediterranean fruits. San Francisco, with a magnificent harbour, is the capital, the terminus of the southern lines from the Atlantic (see fig. 154), the chief Pacific port, and the starting point for routes to China, Japan and Australia, by Honolulu.

East of the Cascade and Sierra Nevada mountains are the arid volcanic plateaus of the Snake basin, and the desert ranges of the Great Basin. Round Great Salt Lake irrigation has received great attention, and Salt Lake City has a large population. Arizona, and New Mexico, on the Mexican frontier, are desert lands, with cliffs and isolated flat-topped hills, of strangely weathered and fantastically coloured rocks. The rivers run in deep canyons, and are often dry. All round the mountains minerals are abundant, especially gold, silver and copper, but the aridity of the country makes it difficult to develop them. The scenery of the Cascades and Rockies is much less imposing than that of the Canadian ranges. The snow-line is higher, the peaks barer, and the forests thinner. Exceptionally beautiful areas are the Yosemite valley, in California, and the Yellowstone Basin, where a large tract, containing geysers, mud volcanoes, terraces and other rare formations, has been set apart as a national park. The whole mountain region is thinly peopled. The largest town is Denver, at the eastern base of the Rockies.

East of the Rockies is the Central plain, which consists almost entirely of the Missouri-Mississippi basin. Look at figs. 144 and 145, and notice that the Mississippi rises at no great height near the Canadian frontier, west of Lake Superior, and flows almost due south to the Gulf of Mexico. Great tributaries come in on both banks. The largest of these on the right bank is the Missouri, which rises in the Rockies, and has a much longer course than the main stream. Both the Missouri and the Mississippi receive many tributaries from the Rockies, flowing east in long parallel valleys. On the left bank the chief tributary is the Ohio, which rises near the east

end of Lake Erie, and with its tributaries drains the western slopes of the Appalachians. Below the confluence of the Ohio the Mississippi flows south as a broad stream, with high embankments, or *levées*, along its banks to prevent it from flooding the low-lying lands on either side. It enters the sea by a great delta. There is much variety in the products of this vast basin, which includes more than 1,000,000 sq. miles. The upper and middle courses of the western tributary cross the drier western plains, where stock raising is all important. Their lower courses and the eastern tributaries are in the agricultural belt, where wheat is grown in the north and maize in the centre. In the hotter south these cereals are replaced by cotton, tobacco, rice, &c. Most of the wheat is sent to Duluth, on Lake Superior, or Chicago, on Lake Michigan, to be shipped to the East, and Europe. Much, however, is converted into flour. Minneapolis, at St. Anthony's Falls, on the upper Missouri, is the great milling centre. Of the many busy towns of the Mississippi notice St. Louis, at the confluence of the Missouri, in the centre of the maize zone (fig. 154). St. Louis, Chicago, and other towns of the Mississippi, such as Omaha, are centres to which the live stock of the western ranches, and the hogs fattened on the maize lands, are sent for slaughter and distribution. New Orleans, on the delta, 100 miles from the sea, is the great cotton market and port. Many other gulf ports, of which Mobile may be noted, are engaged in the same trade.

South of the Great Lakes is one of the greatest coal-fields in the world, covered with manufacturing towns, of which Chicago, and Cincinnati and Pittsburg, on the upper Ohio are the most important. Iron is brought from Lake Superior to Cleveland and other lake ports, and manufactured in Pittsburg and the district. The wooded Appalachians, with isolated but fertile valleys, are still thinly peopled, except between the upper Ohio and the Atlantic, where coal is abundant (fig. 155).

In New England the rivers from the highlands supply

water-power to many busy manufacturing towns. The most important of these is Boston, in Massachusetts, a great port.



FIG. 155. The Appalachian Mountains.

Look at figs. 145 and 155, and notice carefully, immediately to the east of New England, the valley of the Hudson, continued by Lake Champlain, running due north to the St. Lawrence

near Montreal. In the middle of the Hudson valley the Mohawk valley enters from the west, forming a natural route through the mountains to Lake Ontario and the west. The position of New York at the end of this Hudson-Mohawk route has been one of the chief causes of its importance. By this route are brought the agricultural and manufactured products of the interior, to be shipped from New York, on an island at the mouth of the Hudson, and now extending over the neighbouring islands and coasts. New York has a population of 4,000,000, and is the greatest city in the world after London. Other important Atlantic ports are Philadelphia, an engineering and manufacturing centre, at the mouth of the Delaware, and Baltimore on Chesapeake Bay. South of Baltimore is Washington, the Federal capital, and the seat of the legislature and administration. South of Chesapeake Bay the coastal plain widens into a considerable lowland, which is continuous south of the Appalachians with the Central Plain. In the north tobacco and maize and in the south cotton and rice are the chief crops. The Atlantic coast is bordered by swamps and lagoons south of Chesapeake Bay, and in Florida, where orange groves and fruit orchards cover large areas.

Alaska, a territory of the United States, is a mountainous land, highest in the south. It is valuable chiefly for its gold, which is found in the sands of sea and river as well as in the rocks. The Yukon is navigable for a few months in summer, and is the chief means of communication. The capital is Sitka, on an island in the south. Off the Alaskan coast and in the Bering Sea are important seal fisheries.

MEXICO.

The republic of Mexico (area about 767,000 sq. miles) occupies a plateau, rising east and west to lofty mountains continuous with the Rocky Mountains, and to a volcanic chain which borders it in the south (fig. 145). Beyond the isthmus of Tehuantepec and the Yucatan peninsula are

lowlands. The coast is sandy and good harbours are few. Vera Cruz, in the south-east, is the best.

The tropic of Cancer crosses southern Mexico, which receives little rain in the interior. Its varied elevation gives it several zones of climate. Along the coast and up to 3,000 feet is the hot belt (*tierra caliente*), producing tropical products. The coco-nut flourishes near the sea, mahogany and other fancy woods, logwood and other dye woods, are found in the forests. Rice, sugar, cotton, cacao and tobacco are largely cultivated. In the warm zone (*tierra templada*), between 3,000 and 7,000



FIG. 156. Plant Products of Mexico, Central America, the West Indies, and Venezuela.

feet, coffee, bananas, rice, sugar, cinchona, oranges and other southern fruits, maize and other cereals are grown where there is sufficient moisture for irrigation. Aloes and cactuses are characteristic plants in the drier parts. Above 7,000 feet, in the cool zone (*tierra frigida*), cereals are grown (fig. 156).

The mineral wealth of Mexico is very great, especially in silver. The railways climb from the coast to the plateau, and run from the volcanic range north to the United States. An important line crosses the isthmus of Tehuantepec. The capital is Mexico, on a high plain, near the base of Popocatpetl. Guadalajara, Puebla and other large towns

have grown up in the silver districts. Vera Cruz and Tampico are the chief ports on the Atlantic, and Mazatlan on the Pacific coast.

CENTRAL AMERICA.

The small republics of Guatemala, Honduras, Salvador, Nicaragua, Panama, and Costa Rica, with British Honduras, occupy the narrow neck of Central America (area about 173,000 sq. miles). They lie entirely within the tropics, and receive abundant rains, mainly in summer, and heaviest in the east except in the extreme south, where the west is also very wet. The wet slopes are the most densely forested (fig. 149). As in Mexico three vertical zones—hot, warm, and cool—can be distinguished. The lower hot belt is covered with dense forests, producing coco-nuts, rubber, mahogany, bananas, pineapples, and other fruits. Cotton is grown in the lower grounds, and cacao on the hill slopes. The temperate lands are also forested, but the drier parts are grass lands where cattle are kept. Coffee and tobacco are grown in the warm zone. In the cool lands, wheat and potatoes are grown. The west is the cultivated and most populous side (fig. 156). The Panama isthmus is more than 40 miles wide, and across it a great ship canal is being constructed joining the Atlantic to the Pacific.

THE WEST INDIES.

The West Indies consist of the large islands of Cuba, Jamaica, Hispaniola and Porto Rico, forming the Great Antilles, and of many smaller islands forming the Lesser Antilles. All of them are mountainous, many of them volcanic, and most of them densely forested, especially on their eastern slopes. The climate is tropical, with rains in summer and autumn. Sugar is the most important product, but tobacco, coffee, bananas and other products are increasing in importance.

Cuba, a republic under the protection of the United States, is nearly as large as England. It is densely forested.

Among the forest trees are many species of palms, mahogany, and many tropical fruit trees. Sugar and tobacco are the chief cultivated crops. The capital is Havana.

Hispaniola is divided into the republics of Haiti and San Domingo, producing sugar, cotton, &c.

Porto Rico is a mountainous possession of the United States. It has grass lands on the upper slopes, where the forests have been cleared, and plantations of sugar and coffee at lower levels.

Jamaica is a mountainous island, with numerous rivers. It produces excellent coffee, especially on the Blue mountains in the east, sugar, cacao, ginger, allspice, tobacco, and many varieties of fruit. The export of bananas is becoming very important. Kingston is the chief town and port.

The other British islands are grouped into the (a) low Bahama coral islands, producing pineapples and sisal hemp; (b) the Leeward Islands, of which Antigua, the seat of government, with fields of sugar-cane and pineapples, and the mountainous island of Dominica yielding coffee, are the chief; (c) the forested volcanic Windward islands, St. Lucia, St. Vincent and Grenada, producing sugar and cacao; (d) Barbados, dotted with the sugar plantations of its negro inhabitants; and (e) Trinidad, close to the South American coast, important for cacao, and for asphalt derived from a great pitch lake.

SOUTH AMERICA.

Position. Notice that the continent of South America is broadest in the north and tapers to the south. It lies farther south than Africa, stretching between 12° N. and 55° S., if we include the islands forming the southern extremity, of which the largest is Tierra del Fuego, separated from the mainland by Magellan Strait. It is surrounded on all sides by the sea, except in the north, where it joins the narrow neck of Central America. The Pacific washes its western and the Atlantic its southern shores. Its area is about 7,000,000

sq. miles. Notice in fig. 157 that no part is 1,000 miles from the sea.

Relief. Look at figs. 158 and 159, which show the lines from 600 feet below sea-level, and for 600, 3,000, and 6,000 feet above. Notice that the general arrangement of highlands and lowlands is the same as in North America. There is a high mountain area in the west, lowlands in the centre, and highlands in the east.



FIG. 157. Distances from the Sea.

The proportion of lowland is greater in South America than in any other continent except Europe, and the proportion of land over 10,000 feet is also greater than in any other continent except Asia.

The western mountain area, or Andes, is narrower and higher than that of North America. In the north three ranges from the Caribbean Sea converge to the high narrow plateau of Ecuador, which

lies about 8,000 feet above the sea. This is bordered by lofty ranges, averaging about 12,000 feet in height, but rising in Chimborazo to over 20,000 feet, and almost as high in the volcanic cone of Cotopaxi. Other magnificent snow peaks rise from 17,000 to over 19,000 feet, including several volcanoes. Both the Atlantic and Pacific slopes are densely forested. South of Ecuador the Andes of Peru are still threefold, with a high cold plateau between the western and central chains, and a broader and more fertile region between the central and eastern ranges. The height

of the chains is about 13,000 feet, with peaks rising to 19,000 feet. In this section rise the Amazon and its tributaries. Bolivia, to the south, is a high plateau, about 12,000 feet above the sea, and enclosed by lofty ranges which contain some of the highest peaks in South America. Sorata and other peaks rise to nearly 22,000 feet. Lake Titicaca, in the north-eastern part of the plateau, is a basin of inland drainage. South of the Bolivian plateau the ranges converge to one main chain, where Aconcagua, the loftiest mountain of the New World, rises to over 23,000 feet. South of it is the Uspallata, or Cumbre Pass, from Argentina, on the east, to Chile on the west, one of the most important passes in the Andes, and the route taken by a trans-continental railway line in course of construction. The range continues to the south with snow peaks, volcanic cones and glaciers, the eastern valleys containing numerous lakes, and the western slopes forming fiords and islands.

The coastal range is not always so well marked as in North America. Notice the valley of Chile, between the Andes and the coast range. It may be compared with the valley of California, while the sounds and islands of Southern Chile recall British Columbia.

The Eastern Highlands consist of the Guiana Highlands in the north-east, separated by the Amazon basin from the Highlands of Brazil. Both are forested tablelands, cut by deep gorges, to which the rivers descend in magnificent falls. The Brazilian Highlands rise steeply from the Atlantic and slope to the west.

The plain between the Andes and the Eastern Highlands is drained by three great rivers, the Orinoco, between the Andes and the Guiana Highlands, the Amazon, between the Guiana and Brazilian Highlands, and the Paraguay-Parana, south of the Brazilian Highlands (figs. 158, 159).

The Orinoco rises in the tropical forests of the Guiana Highlands and divides into two branches. Notice that one of these, the Cassiquiare, flows to the Negro, a tributary

of the Amazon, connecting the two river systems. The



FIG. 158. The Physical Features of South America.

main stream of the Orinoco flows round the eastern base of the Guiana Highlands, receiving many long, parallel

tributaries from the west, navigable to the base of the Andes, which descend very steeply to the lowlands. The river crosses the llanos, or savana lands of Venezuela, and



FIG. 159. Key to Relief Map of South America.

enters the sea by a great delta, through densely forested swamps.

The Amazon rises in the Andes of Peru, by two main streams, the Marañon, between the western and central Andes

of Peru, and the Ucayali, which rises farther south in the eastern chain. The Marañon cuts its way through the two outer ranges of the Andes, and joins the Ucayali, both rivers forming numerous falls and rapids, as they descend the steep forested slopes to the plains. The united river is navigable for the remainder of its course, a distance of over 3,000 miles. It receives many tributaries from the Andes of Ecuador, Peru, and Bolivia, the largest being the Rio Negro on the left bank, and the Rio Madeira on the right bank. Both are immense rivers, and the Amazon itself is as broad as an inland sea. In places its depth is as much as 120 feet, and the volume of water it carries to the ocean is enormous. For the whole of its course it flows through dense tropical forests, often breaking up into parallel streams, and bearing innumerable forested islands on its broad waters. It enters the ocean by a great estuary, up which the tides rush with extreme violence. The influence of the Amazon itself can be seen and felt for a great distance out to sea. The estuary is nearly filled by the island of Marajo, not much smaller than Scotland. Notice in the map the Para river, the channel generally used for ships entering the Amazon, and the Tocantins, from the Brazilian Highlands, which enter it.

Look at the map and notice how low the land is which separates the basins of the Amazon and the Parana-Paraguay. In the wet season the two systems are joined. The Paraguay flows south through open forests, receiving the Parana from the open forests of the Brazilian Highlands. The united river flows through the grass land or pampas of Argentina, and turns south to the Plate estuary, or Rio de la Plata. Notice the Uruguay, which also flows to the Plate estuary, almost in the same line as the middle Parana.

Besides these great rivers two others should be noticed, the Magdalena, with its tributary the Cauca, both flowing in long parallel gorges from the Andes of Ecuador, north to the Caribbean Sea, and the São Francisco, which rises in the

south of the Brazilian Highlands and flows north and east to the Atlantic.

South of the Plate estuary a number of short rivers drain the eastern slopes of the Andes, not all of which reach the ocean.

Climate and Products. Notice that South America is broadest immediately south of the equator, just where South Africa contracts in width. Also that the greater part of the land lies within the tropics, but that south of the tropic of Capricorn it tapers rapidly. Over the greater part of the



FIG. 160. Mean Temperature of South America in January reduced to sea-level.

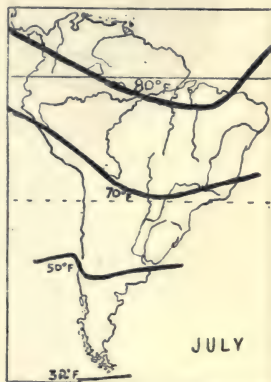


FIG. 161. Mean Temperature of South America in July reduced to sea-level.

continent, therefore, the temperature is high at all seasons, and except in the mountain area, where the hot, warm and cool belts are found, there is no great range of temperature. Notice that in the lowlands the greatest range of temperature is found in the upper Paraguay basin (figs. 160, 161). South of the tropic of Capricorn the temperature gradually falls, and in the extreme south, in the latitude of Ireland, the temperature generally resembles that of Ireland.

Look at the rainfall map in fig. 162 and notice in the lands east of the Andes the great breadth of the equatorial rain belt, which is the largest area of heaviest rains in the world, and

also that the Andes form a barrier to the trade winds. The enormous volume of the Amazon and the density of the

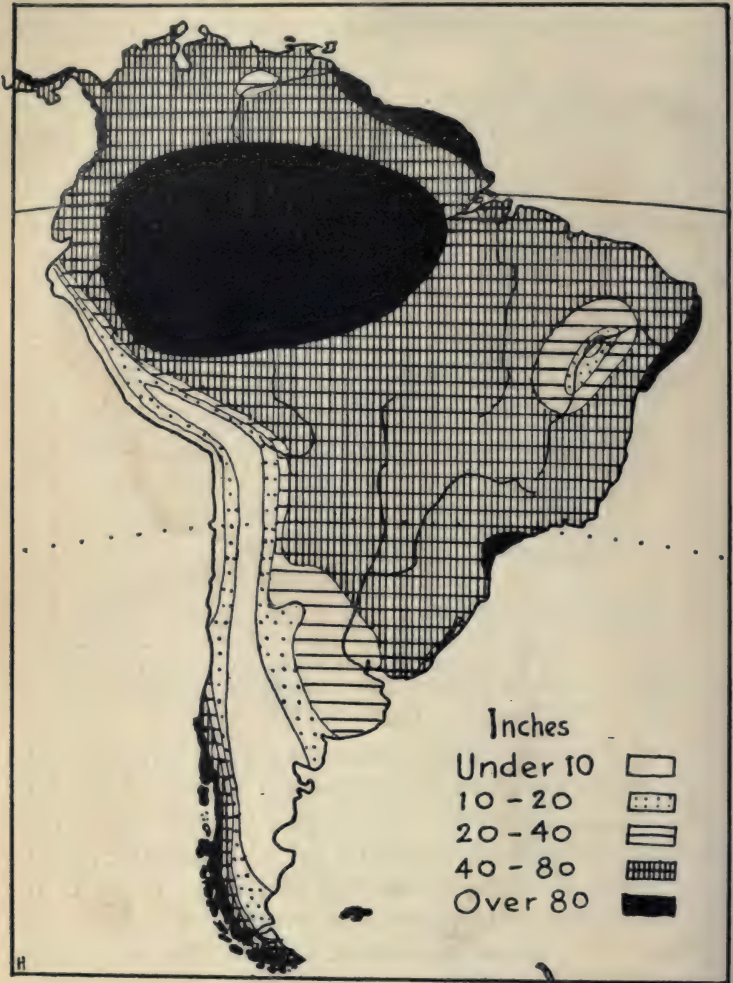


FIG. 162. Mean Annual Rainfall.

tropical forests are both due to the immense rainfall of this region. It would be impossible to give any idea of the rich-

ness of this forest, the extent of which is little less than that of Europe. Rubber is an important product. Palms, figs, mimosa, and bamboo are characteristic trees, and these are

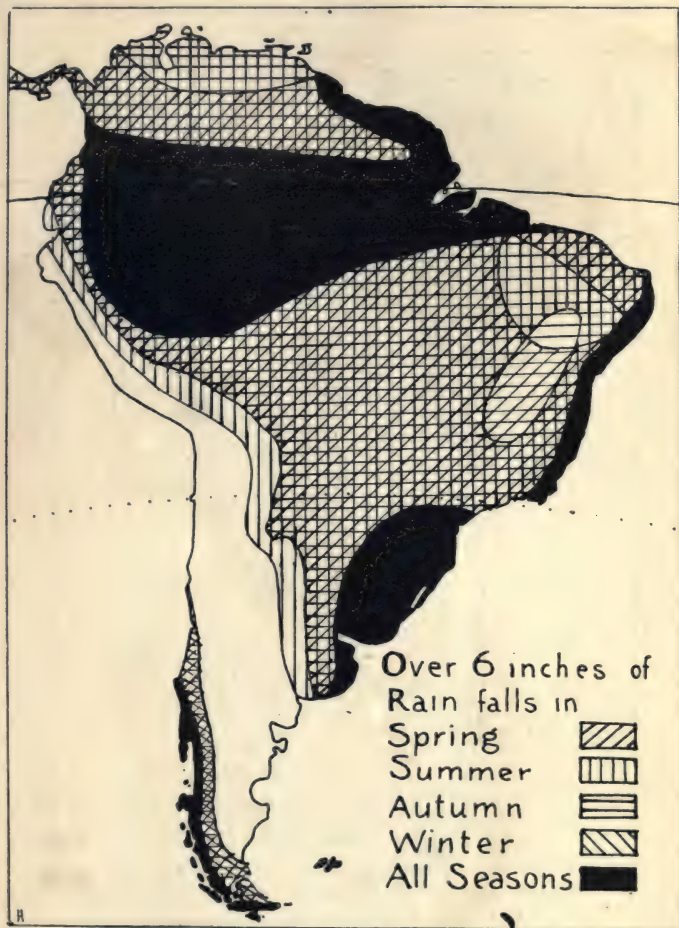


FIG. 163. Seasonal Distribution of Rainfall in South America.

covered with creepers and parasites of many descriptions. This great forest area—the selvas—is still little known, except round the rivers, and the density of its vegetation makes it very diffi-

cult to penetrate. North and south of this belt of equatorial rains and dense forests, are regions with summer rains, forming opener woods, as in the campos of Brazil, and savanas, as in the llanos of the Orinoco or the pampas of the Plate basin.



FIG. 164. Products of South America.

These belts may be compared with the corresponding belts in Africa. In the extreme south the country is drier, with slight winter rains on the coast. West of the Andes, from the Gulf of Guayaquil northwards rain is abundant, but southward the

western coast, lying in the lee of the trade winds, is a rainless desert, corresponding in position with the Kalahari and Australian deserts, but extremely narrow, owing to the near approach of the Andes to the sea. The Chilean valley has the



FIG. 165. Food Products of South America.

Mediterranean climate of dry summers and winter rains. South of 42° , where the coastal range breaks up into islands, rain falls at all seasons of the year, as in British Columbia, or northern Europe. Evergreen pine woods clothe the slopes of the

mountains. On the eastern slopes, where little rain falls, are the thorny scrub lands of Patagonia. The seasonal distribution of rain is shown in fig. 163.

Many of the animals of South America are peculiar to that continent. Neither the elephant nor the hippopotamus of the Old World are found. The lion is represented by the puma, and the tiger by the jaguar. The llama, or South American camel, is used on the high passes of the Andes, as the yak is used in Tibet. The alpaca, belonging to the same family, domesticated for its wool, is also found in the Andes, in which the characteristic bird is the great condor. Many exquisite small birds flit through the tropical forest, including the humming-bird and the bird of paradise.

The domesticated animals of Europe have been introduced outside the forest and mountain area, and sheep, cattle, and horses are kept in large numbers on the pampas (fig. 164).

Occupations. South America contains but a small part of the population which its enormous natural resources could support. The inhabitants number about 36,000,000 and are at all stages of civilization. In the tropical forests are wandering tribes, ignorant of agriculture and the arts of life, who live by fishing and gathering forest produce. At the other extreme are the great cities of Rio Janeiro or Buenos Aires, with enormous populations, flourishing industries, and all the conveniences of the modern world. The forest is yet little utilized, except for the collection of rubber. The grass lands are among the great stock-rearing regions of the world. Agriculture is carried on all round the margin of the continent, as well as on the mountain slopes and plateaus, and in the lowlands of the Magdalena and Plate basin. For the chief plants cultivated see fig. 165. Manufactures are little developed, but are growing in the large cities.

Races. The bulk of the white population is of Spanish descent on the eastern, and of Portuguese descent on the western side of the continent, with a considerable proportion of Germans in Brazil, and of British in British Guiana, Chile

and Argentina. Both Spanish and Portuguese have intermarried with the native Indians, forming a mixed race. The Indian tribes are more numerous than in North America,



FIG. 166. Towns and Routes in South America.

especially in the mountains and forests. They are at all levels of civilization.

Political Divisions. The Andes form the states of Colombia,

Ecuador, Peru, Bolivia, and Chile. East of Chile extends the great lowland country of Argentina, with the smaller states of Uruguay and Paraguay, round the rivers of the same name. Brazil occupies in the north-east an area equal to that of Europe. On the north lie Venezuela, and British, Dutch, and French Guiana. Except the three last all are republics. The chief towns and routes are shown in fig. 166.

Colombia. Colombia (500,000 sq. miles) consists of a coastal strip, a high Andean region, the lowlands of the Magdalena and Cauca, and the llanos in the east. The coast and Andean region have four climate and vegetation zones, (1) the hot belt with sugar, cacao, and tropical fruits up to 3,000 feet; (2) the warm belt with temperate products, well suited to coffee and maize, up to 6,500 feet; (3) the cool belt, up to 10,000 feet suited for northern fruits and cereals; (4) the treeless paramos, over 10,000 feet. Cattle are kept on the llanos, round the Cauca, and on the lofty plateau of Bogota. Railways hardly exist, roads are bad, and the Magdalena is the chief means of communication between the interior and the coast. The capital is Bogota, nearly two miles above sea level.

Ecuador. Ecuador (120,000 sq. miles) consists of the coast and Andean area, the eastern slopes of which descend to the tropical forests of the Amazon basin. In climate and productions it resembles Colombia. Both east and west are densely forested, except in the higher parts. The cinchona tree is of great importance for the manufacture of quinine. A railway climbs from Guayaquil on the coast to Quito, over 9,000 feet above the sea.

Peru. Peru (460,000 sq. miles) consists of the coast, the Andean area, rich in minerals, and tropical forests in the Amazon basin. The coast is a desert, crossed by fertile valleys, in which are grown cotton, sugar, tobacco, rice, &c. Alpacas and vicunas are numerous in the mountains, producing excellent wool. The eastern forests supply cinchona and rubber, and cacao is largely cultivated. Mining, especially

silver and copper, is important in many parts of the mountain area. Railways climb from the coast to Pasco, the centre of the silver district, and to Lake Titicaca on the Bolivian plateau. The capital is Lima, with Callao as its port.

Bolivia. Bolivia (570,000 sq. miles) has no coastal area, but consists of the Andean region in the west, and of the forested Amazon lowlands in the east. Mining is important in many parts. Alpacas and vicunas yield large quantities of wool. The eastern valleys produce cinchona and the finest qualities of cacao and coffee. In the forests rubber is an important product. The chief town is La Paz, near Lake Titicaca, the centre of the cinchona trade. From Southern Bolivia a line runs over the southern Andes, to Antofagasta, in Northern Chile.

Chile. Chile (295,000 sq. miles) is a long narrow country, larger than any European country but Russia. The northern part of it consists of the Atacama desert, from which are obtained large quantities of nitrates, one of the best fertilizers known. The valley of Chile is very fertile, producing Mediterranean fruits and cereals, of which the vine, grown for wine and raisins, is the most important. In the centre is the capital, Santiago, a handsome modern city, connected by a railway over the coastal range with its port, Valparaiso. Concepcion is the chief town in the south, near a coal-field. Punta Arenas, in the south, is in a gold-mining, sheep-rearing district. The southern fisheries are important. Much of Chile, especially in the forested areas, is undeveloped, but the country is advancing rapidly. A trans-continental railway to the Plate estuary is being constructed, crossing the Andes by a tunnel under the Uspallata Pass.

Argentina (1,800,000 sq. miles), **Paraguay** (140,000 sq. miles), and **Uruguay** (72,000 sq. miles) the countries of the Plate basin, together occupy an area half the size of Europe. At the western foot of the Andes the climate is arid. In the south the chinook winds clear the ground of snow and allow of stock raising. The north is too hot and dry for cultivation,

except under irrigation, when sugar, tobacco, the vine and other southern fruits can be grown, round Tucuman and other centres. On the pampas vast quantities of stock are kept, and the making of meat extract is an important industry. The eastern part, round the Parana and Uruguay is a great wheat and maize growing region. Large quantities of cereals are exported, from Rosario on the Plate estuary, Buenos Aires, the capital of Argentina, La Plata, and Montevideo, the capital of Uruguay. The capital of Paraguay is Asuncion.

The railways of Argentina are well developed, connecting all the important centres. The trans-continental line is carried by Mendoza to Las Cuevas, which will be the Argentine end of the tunnel under the Andes.

The Falkland islands (6,500 sq. miles), off the extreme south-east of Argentina, are British. The climate is cold and rainy. Sheep-rearing is the principal occupation. Port Stanley, on the eastern of the two islands, is the chief town.

Brazil. Brazil (3,300,000 sq. miles) lies between the tropics, except in the extreme south. The greater part of it is occupied by the vast Amazon forest, the rest by the savanas and campos of the Brazilian Highlands. The vast forested interior is little developed, and large areas are not even explored. Cattle are kept in the southern savanas. The highland margin, round São Paulo, is a coffee-growing district, the port of which is Santos. The towns are almost all on the coast, though Manaos, at the confluence of the Amazon and Negro, is an important port. Para, or Belem, at the mouth of the Para river, is the great port for rubber and forest produce. Pernambuco, and Bahia or San Salvador, are the ports for the agricultural districts, in which sugar, cacao and tobacco are grown. The capital is Rio de Janeiro, one of the largest cities of the New World, on a magnificent bay, backed by mountains. Railways are developing in the east.

The Guianas. The Guianas consist of unhealthy lowlands, densely forested, rising to the Guiana Highlands in the south. Sugar, cacao, coffee, and cotton are grown on the irrigated

coastal plains. In the south of British Guiana are rich but inaccessible gold-fields. The capital of British Guiana (120,000 sq. miles), or Demerara, is Georgetown. Paramaribo is the capital of Dutch Guiana (46,000 sq. miles), and Cayenne of French Guiana (30,000 sq. miles).

Venezuela. Venezuela (600,000 sq. miles) consists of three very different regions. The first is the eastern end of the Andes, where the valleys and slopes are cultivated with sugar, cotton, cacao, and other tropical products. This is the only settled part of the country. The capital is Caracas, lying in a fertile valley behind the coastal range, which is crossed by a railway to the port La Guayra. The second region is the lowlands of the Orinoco, a cattle country, as yet little developed. The third is the forested western slopes of the Guiana Highlands, little known, except round the gold-fields in the north.

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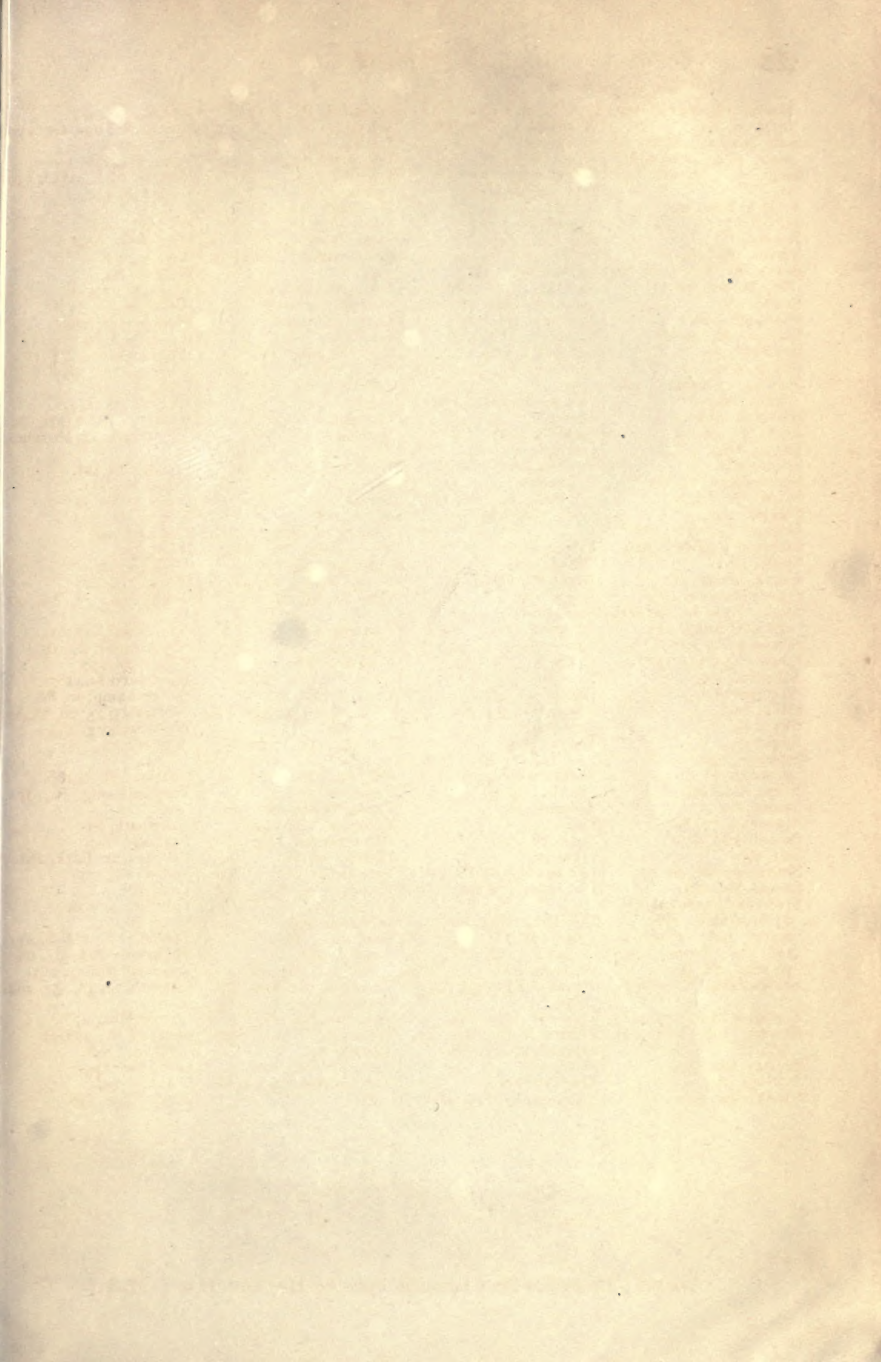
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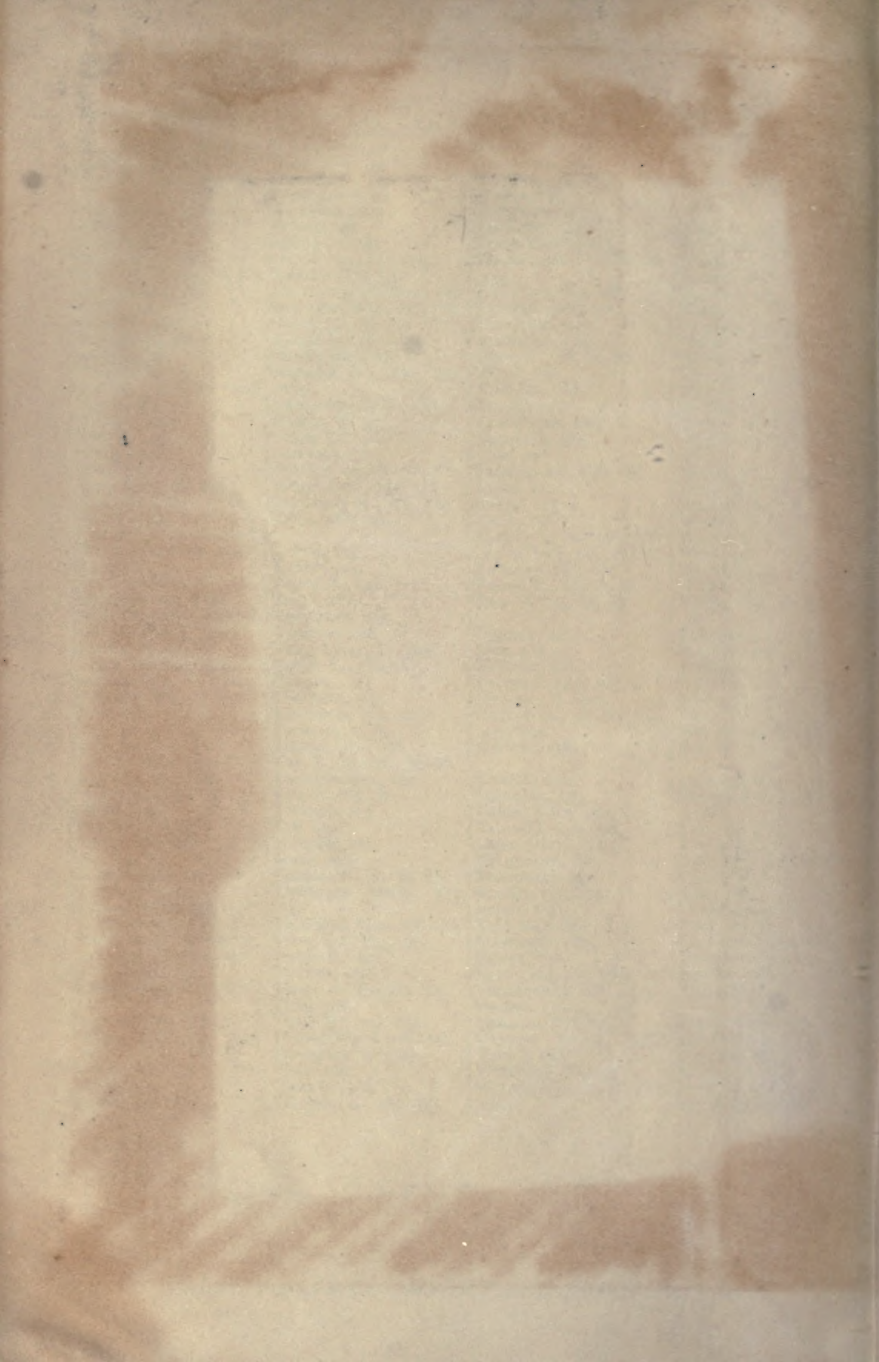
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